

JOURNAL  
OF  
THE MILITARY SERVICE INSTITUTION  
OF THE  
UNITED STATES.

*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.*

VOL. XVIII.

MAY, 1896.

NO. LXXXI.

**Prize Essay of the U. S. Infantry Society.\***

THE ARMY; ITS EMPLOYMENT DURING TIME OF  
PEACE, AND THE NECESSITY FOR ITS  
INCREASE.

BY MAJOR GEORGE S. WILSON, ASSISTANT ADJUTANT GENERAL.

"There is a rank due the United States among nations, which will be withheld, if not absolutely lost, by a reputation of weakness. If we desire peace, one of the most powerful instruments in our rising prosperity, it must be known that we are at all times ready for war.—WASHINGTON.

THE MAINTENANCE OF A STANDING ARMY.

A FUNDAMENTAL principle of self-government lastingly grounded in the minds of the American people forbids the maintenance of a standing army of strength to warrant thought of danger therefrom to liberty and free institutions. Another limitation is a business one, founded on our geographical and political separation from the great armed powers of the world. We reason that because of this isolated situation war with a formidable power is improbable, and even should we become engaged in one, large hostile armies could not be transported to our shores, and therefore it would be useless expense to maintain a large force to meet a possible but doubtful contingency, which, even did it occur, would be no serious matter any way.

On the other hand, there has been no time since the formation

\* Board of Award, Hon. C. F. Manderson, Hon. Theodore Roosevelt, and General E. A. McAlpin, Adjt. Gen. N. G. S. N. Y.

of the Government one hundred and six years ago, when we have not believed it to be in the best interest of sound governmental policy to maintain, and we have maintained, a small military force called the Regular Army; proportioned to what has been deemed necessary to meet internal police purposes, and to serve as a living exponent and nucleus of latent military power existing in our militia, to be called into activity at the cry of war. The proper size of this Regular Army will come up for discussion further on.

#### THE EMPLOYMENT OF THE ARMY IN TIME OF PEACE.

What in a legal sense distinguishes "time of peace" from "time of war," the gradations and distinctions between riot, insurrection and rebellion, and kindred questions are matters of no interest in this discussion, the aim of which is to treat of the proper size and most profitable future employment of the Army when it shall not be engaged in warfare. Broadly speaking we will define peace to mean the absence of war, and war to mean warfare against foreign powers or against organized and formidable rebellion. And here it may as well be said that technical and legal points and definitions concerning the Army in its existence, organization or employment, will not be argued. It will be assumed that the Army is to continue to exist and to be organized and employed under the authority of the Constitution and the laws of Congress.

Beginning with the formation of the Government under the Constitution in 1789, at which time the Army consisted of 672 officers and men, the country has enjoyed peace periods as follows: from 1789 to 1812 (War with Great Britain)—22 years; from February, 1815, to April, 1846 (Mexican War)—31 years and two months; from July, 1848, to April, 1861 (War of the Rebellion)—12 years and 10 months; from August, 1865, to the present time, 30 years. That is, of our one hundred and six years of national life, ninety-six have been devoted to peace and ten to war. But in this exhibit no account is taken of the war (?) with France in the latter part of the last century, and the war with Tripoli in the beginning of this, in neither of which was the Army engaged. Our numerous Indian troubles are also excluded, although many of them, if judged from a physical point of view, could properly be classed as wars of no little magnitude.

The first employment of moment of an armed force in executing the laws other than against Indians is found in connection



with the celebrated Whiskey Riots in Western Pennsylvania, in 1794. This insurrection began in the forcible resistance to the collection of an excise tax. Indictments had been found against a number of distillers for violation of federal law, and warrants placed in the hands of a United States marshal for service. In attempting to serve these warrants the marshal and revenue officers were forcibly resisted by armed men, and the local militia was called upon for aid, but refused to act. A detachment of eleven regulars was then obtained from the small garrison of Fort Pitt with which the marshal and his party took refuge in a house, where they were attacked by five hundred armed men and compelled to surrender. Disaffection rapidly spread throughout Western Pennsylvania and a part of Maryland and Virginia, so that by August no less than seven thousand armed insurgents had assembled at Parkinson's Ferry, near Pittsburg, and they counted upon an ultimate force of fifteen or sixteen thousand. In the meantime President Washington, having first obtained a certificate of a judge of the Supreme Court "that in the counties of Washington and Alleghany the execution of the laws was obstructed by combinations too powerful to be suppressed by ordinary course of judicial proceedings," called out from the States of New Jersey, Pennsylvania, Maryland and Virginia fifteen thousand militia. The militia responded, and Gov. Lee, of Virginia, was placed in immediate command of the expedition; but Washington himself exercised chief direction, even accompanying the troops as far as Carlisle. This force reached Parkinson's Ferry November eighth, and soon thereafter the insurrection collapsed. At that period such regular force as existed was engaged against Indians in the Northwest.

Passing by such minor employment as was from time to time made of troops in assisting the civil authorities in the execution of the laws we next come to the use made of the Army in the troubles in Kansas and at Harper's Ferry during the Buchanan Administration. Of this turbulent period little need be said. Although occurring in time of peace, the Kansas troubles and poor old John Brown's fanatical exploit of treason on the "sacred soil of Virginia," and within the walls of a United States building, were really the advance skirmishes wherein was shed the first blood in that mighty conflict of arms which was to decide whether the Constitution makers had really constructed an enduring temple of liberty, or had only put together a beautiful

house without nails, that it might be taken down and its separate parts carried off at the individual will of any of its occupants. So of the employment of the Army in reconstruction duty. It was the aftermath of the great conflict, inseparably connected with it. The conditions under which the service was rendered, and its nature, were not connected with the ordinary problems of government, were without precedent, and, let us hope, are never to be repeated. Of that period it is only necessary here to say that, from first to last, the Army had a delicate and responsible duty to perform, which it executed faithfully, temperately and wisely.

The Utah Expedition of 1857-58, in which about twenty-five hundred regular troops were employed to suppress open and defiant rebellion of the Mormon population of that distant country, hardly rose to the dignity of war. Yet the magnitude of the expedition and the extraordinary and serious nature of the conditions in Utah which demanded it, were such as to raise its nature above that of the ordinary employment of troops in executing the laws in time of peace.

The next important employment of the Army in assisting civil authority to execute the laws is found in connection with labor and strike riots, first in 1877, and again in 1894. In 1877 the riots, with their central force in Pennsylvania, spread over ten States of the Union, paralyzing business and subverting law and order throughout from the Hudson to the Mississippi. State and municipal governments were confessedly powerless to protect life and property, and by requisition of State governors federal aid was invoked and regular troops sent to the various scenes of violence. The troops soon succeeded in restoring law and order.

The memorable strike riots of 1894 were still more widespread, reaching as they did two-thirds of the way from one ocean to the other; and considering the organized source from which they emanated and were directed, they were also of a more serious and alarming character. Chicago was the point of greatest danger, but at over fifty other places violence took place or was threatened, and only prevented by the timely intervention of troops. Again the Army was called upon in the interests of law and order, and again it performed its mission to the satisfaction of the people. From first to last, over one hundred and fifty companies of cavalry, artillery and infantry, and about four hun-

dred sailors and marines, were employed to suppress these riots; a force deplorably disproportionate to the number of the law breakers, and yet equal to nearly one-half of the available force of the United States Army.

The Army's century of Indian service may be classed as regular warfare or as police duty, to suit the fancy. As a matter of fact, it was hard service, fraught with sanguinary engagements, great casualties, and untold hardships; and often, as in the earlier campaigns in the then North-west, the Florida wars, and some of the more recent campaigns, large forces of troops were engaged against formidable numbers of Indians. Surely many of these campaigns have been bloody wars. But for all this, these wars, so far as they themselves affected the status, were carried on "in time of peace." The conditions which entailed all this trouble with the Indians were anomalous, growing out of the presence with us of a savage race, who until very recent years forcibly disputed our right to this country; and yet who were so weak in numbers, so scattered territorially, and so lacking in political autonomy that we could not properly regard them in other light than as an aggregation of troublesome savages over whom we had a right to exercise control. But the Indians have at last given up the struggle and acknowledged our supremacy; and the "anomalous conditions" and the occupation of the Army growing out of them are, or very soon will be, things of the past.

In this retrospect it has been the aim to bring to mind such notable instances of the employment of the Army in time of peace as are believed to have been of immediate vital service to society, and also to have exercised a lasting influence on the policy to be pursued concerning the Army's share of work in the future duties of the executive department of the Government in "taking care that the laws be faithfully executed."

Speaking in general terms, the Regular Army exists for a two-fold purpose: First, as a plant for the formation of armies out of the raw material to meet possible international warfare or organized rebellion; and second, as a national police force complete in itself, to aid the civil authority in executing the laws when "obstructed by combinations too powerful to be suppressed by ordinary course of judicial proceedings."

As we have seen there have been at least three instances of the services of the Army in connection with the civil authority

in rescuing society from the thralldom of mob violence and upholding the supremacy and dignity of national authority. Had other than a Washington been President at the time fifteen thousand men were gathering and arming west of the Alleghanies with insurrectionary intent, what would have been the destiny of this country? At that time the Government had but recently emerged victorious from a war of revolt against a strong government which had oppressed it, the patriotism of the Revolution had not had time to fully crystallize around the national idea, and open talk of a Western Confederacy soon thereafter lured Aaron Burr on to treason. Patriot and far-seeing statesman that he was, Washington promptly took fifteen thousand soldiers from a poverty stricken population of five millions, and not a man too many or a day too soon to nip the incipient rebellion in the bud. It is true the force used by Washington was necessarily militia, for there was no regular army to meet the emergency, but nevertheless it was the use of organized military power wielded by the Federal Government. The labor riots of 1877 gave the country experience on a large scale of a comparatively new source of trouble. They were less serious than the Whiskey Riots, as they scarcely could be said to threaten the integrity of the Government, but they were forerunners of dangers of a different nature, and ones which we will have to confront in the future. The Regular Army suppressed these troubles.

And now we come down to the great strike troubles of 1894. Concerted strikes controlled by powerful organizations suddenly brought tens of thousands of able bodied men first into idleness, next into unlawful interference with the rights of others, and finally into open, defiant and violent opposition to the laws of the land. These riots also were suppressed by the Regular Army; and again it is interesting to speculate in our minds as to how else, or at what cost of life and treasure they could have been overcome. Our faith in the stability of Anglo-Saxon free institutions is too great to admit doubt as to the final outcome. And yet how near we were to insurrection and bloody scenes of the most revolting nature that could afflict a civilized people! Bloodshed and destruction were present, anarchy and chaos in sight. Speaking of this crisis (September, 1894, *Forum*), Judge Cooley says:

"When interstate commerce was interrupted, \* \* \* President Cleveland sent to Chicago, the point of greatest disturb-

ance and disorder, a considerable military force to aid the civil officers, and to protect the carriers of the mails and the persons and vehicles employed in interstate transportation while they continued or made efforts to continue in the performance of the customary service. This at once brought out a protest from the Governor of Illinois, who insisted that the President was encroaching upon the rights of the State. \* \* \* Governors of some other States were understood to concur in this view. When the President replied to the protest that the United States troops were sent into the States only to enforce national laws \* \* \* the reply was treated as insufficient, the protest was repeated from time to time, and the consequent excitement tended to keep the disorderly elements bold and defiant, so that the demand was even made by some of them that the governor should employ the military power of the State to remove the federal force.

\* \* \* "But the position of the governor was that the maintenance of peace and the repression of disorder was a State duty, and the President was consequently guilty of usurpation when he thus without request moved troops into the State for the purpose.

"We cannot admit that the position taken is even plausible. It has no warrant whatever in the federal constitution, which, on the contrary, is distinctly against it."

\* \* \* The position here taken by Judge Cooley is fully concurred in by the country at large as well as by the constitutional lawyers, and the use of the military arm by the Chief Executive to aid in "taking care that the laws be faithfully executed" has, by Mr. Cleveland's action in 1894, become a fixed policy of the Government. And it is predicted that the elements of discord which have caused these domestic disturbances are with us to stay, any way for a generation or so, and the future will bring forth many painful occasions for the use of the Army as a police force.

We also need an army as a partial preparation for war; and while we will never maintain a military peace establishment adequate to meet the demands of a conflict with even our weakest neighbor, we should maintain a force sufficient to serve as a basis for such an army, and which should keep alive the military spirit and knowledge. But we sometimes hear it said: "Why should we keep an army? War is barbarism, and arbitration has taken

its place." Again, it is held that we are a people to ourselves, that the ocean separates us from complications and wars, and so on to the end of the argument. War *is* barbarism, and it is to be hoped arbitration will supplant it. But wars are not ended; arbitration is in its infancy, and so refined a child of civilization may have many set-backs, and at best is of slow growth. In the old sailing days the oceans *did* separate us from the other nations by ten to twenty weeks; now they separate us by ten to twenty days for army transports, and by five or six days by passenger ships. And our policy of non-intervention in the affairs of others, even if we maintain it (which we are not likely to do) is one sided. It binds no one not to interfere with us. But the uses and necessities for an army will come up for further discussion in succeeding pages.

The employment of the Army in time of peace may for convenience be discussed under two heads; first, its employment as a police force or for other special purposes under orders emanating from the President; and second, its occupation and daily life when not so engaged. It is the last named employment we will now consider, and it also may be divided under two heads. First, its internal duties and occupations incident to its existence as a complete organization, and second, its duties as a disseminator of military knowledge and training among the people as a preparation for war. It is conceded that we will never maintain a large army, but that we will keep a small one. In this view it is plain that it becomes all the more important that our Army should employ itself in acquiring and maintaining the highest type of perfection known to military bodies. To properly discuss this subject would involve going into questions of organization and administration to a degree foreign to this paper, but in a general way it is proper to say that the personnel, organization, equipment, supply and administration of the Army should be such as to insure to the service the highest obtainable standard of excellence. Discipline should be as a rod of iron. It may seem hopelessly illogical to claim that the army of a free people needs to be kept in stricter discipline than any other army, with wider space between the officers and enlisted men, yet there are natural reasons why it should be so. The armies of Europe are drawn from people who for countless generations have lived under monarchical institutions and class government where every man is born and bred to pay homage to some other man, and the habit of



subordination to the will of another is a matter of heredity. It is natural that when such a man finds himself in the army he is not only amenable to discipline, but any relaxation on the part of the officer would be accepted as a matter of grace. With us these conditions are reversed. Every man is born and bred in the idea of equality, and means of discipline are entirely artificial productions of law, not only without support from traditional habit, but they have that habit to overcome; and familiarity on the part of the officer would breed contempt of authority. But the state of discipline in the Regular Army has an influence for good or evil beyond its mere application where enforced. It becomes the standard of measure of obtainable discipline among the militia and volunteers when called into service, and while it is not expected that the citizen soldiery should come under the rigid discipline of regulars, the nearer they can be brought to it the more efficient would be the Army. Now, no matter what the standard of discipline in the Regular Army the citizen soldiery would attain the same relative approach to it whether it be high or low.

The sea-coast defenses of the country, and the duties of the Ordnance Department in supplying proper armament for them, as well as in making provision for arming and equipping armies for war purposes, are of vital and immediate importance, but do not come within the province of this paper.

The duty of the Army as a disseminator of military knowledge is more important than would at first appear. Its importance as well as its necessity grows out of the smallness of the Army, and the need that it be kept at a high standard of perfection that it may be a model and a teacher. It is sometimes claimed that an efficient National Guard would obviate the necessity for a standing army. That could never be, for without the Army as a central model and inspiration the National Guard could not be efficient. As well talk of having good common schools without a college or university in the land. Remove the Regular Army and the National Guard as it is to-day would not survive half a generation. This would be true even if the Guard had never seen an army officer in the line of official contact. The Army is the conservator of the military art and tradition. It gathers and treasures the experience of the past wars from which it formulates organization, regulations, drill systems, means of supply, administration and plans of battles and campaigns. It keeps



abreast of the times in arms, equipments and all mechanism of war. And it also manufactures, as it were, a standard of discipline and military ethics. Without the example of all this the citizen soldiery would be at sea in attempts at organization and control. This suggests the proper employment of the Regular Army during time of peace. It is not enough that the Army be a perfect piece of physical machinery; it should also be the embodied martial soul of the nation, ready at the call of duty to animate with its spirit and knowledge the real Army on which we must rely to uphold the honor and dignity of the United States.

But in a higher sense there is mutual dependence and community of interest between the Regular Army and the National Guard. The latter is dependent on the former for moral support and inspiration as well as for theoretical and practical instruction, and the former relies upon the Guard as a valuable adjunct in its work of keeping the country in as complete a state of preparation for war as means at hand will permit. The National Guard is also a factor in the education of the Army, for it is mainly with the citizen soldiery that the wars of this country will have to be carried on, and any duty or association which brings army officers in active contact with the material with which they will have to work, when the time for work comes, is a valuable experience for them and a benefit to the country. Another, and a kindred field of useful employment for the Army in time of peace, is found in the military training of the youth of the country at the institutions of learning. While this means of training the people for military duty is necessarily secondary in its value to that derived through the National Guard, it cannot fail of being of great benefit. Previous to the War of the Rebellion the Army seems to have taken little or no part in the instruction and encouragement of the militia, nor did it otherwise engage in the dissemination of military knowledge among the people; consequently when the war broke out ignorance of military matters was dense. Perhaps it was realization of this ignorance which prompted Congress in 1862 to provide for the detail of twenty army officers as instructors of the military art at certain colleges. Since then the number has, from time to time, been increased to one hundred. It was not until about twenty years subsequent to the close of the war that army officers came much in contact with the National Guard as inspectors, instructors, etc., and about this time the National Guard commenced its gradual increase in numbers

and efficiency. Before the war the Seventh New York, and a few other organizations, not more than could be counted on the fingers of one hand, were all that were worthy of notice. Now such States as New York, Pennsylvania, Ohio, and others, could turn out regiments and battalions able to sweep from the field ten times their own numbers of green men and boys, such as hurriedly came together at the rendezvous in 1861. Of the present condition of the National Guard and the relations of the Army to it, and also of military instruction in schools and colleges, the Secretary of War, in his report for this year, says:

" STATE TROOPS.

" The efforts of recent years to bring the Army into closer relations with the National Guard of the States may now be regarded as having established a permanent union between the two forces, advantageous to both. During the year 33 officers, 6 more than in the previous year, were permanently detailed at State headquarters, and 43 States secured for temporary duty the services of army officers. State encampments of troops were held by 22 States, to which 25 additional officers were assigned as instructors and inspectors.

" The conditions are favorable to the development of a volunteer force of upwards of 100,000 men, of the highest efficiency and prepared for any service. Legislation, however, is necessary to put to the best use the relations which have been established between the Army and the troops of the States. The laws of the United States relating to the militia were enacted in 1792, and need thorough revision and renovation to bring them into accord with present requirements.

\* \* \* \* \*

" The appropriation for the National Guard has remained unchanged for many years, although the country's population has multiplied many fold. Repeated recommendations for an increase of this appropriation have not met with favorable response from Congress, though the reasons for such increase seem obvious. \* \* \*

" Community of interests, mutual respect, and familiarity with each other's methods have been established between the Army and the State troops in peace, but unity of action on the field requires uniform armament and equipment.

\* \* \* \* \*

## " MILITARY SCHOOLS AND COLLEGES.

"The number of pupils at schools and colleges receiving military instruction from officers of the Army has more than doubled within the last four years, and the steadily increasing interest of the youth of the land in military affairs is apparent. Last year 99 officers, a larger number than in any former year were detached for this duty. The students attending schools and colleges at which military instruction was regularly imparted during the year numbered 35,638, of whom 23,723 were capable of military duty.

"The relations of these schools with the National Guard of the States are becoming closer, and one of the valuable consequences of this system of military instruction is that those receiving it in many instances after leaving school enter the National Guard as officers, and thus contribute to the morale and discipline of our citizen soldiers.

"I renew my recommendation that the law be so amended as to extend the opportunities for military instruction by officers of the Army to high schools of cities and normal schools of States having a requisite number of pupils."

\* \* \* \* \*

From this it is seen that "the employment of the Army during time of peace" is, to an extent never before attained, the instructing of the militia and the youth of the country in the duties of soldiers that we may not be entirely defenseless in the face of so terrible a danger as modern war.

In closing these suggestions of what we deem to be proper future employment of the Army in peace time, it will be noticed that no new or strange line of duties is recommended. It is believed that the Army is, in all essential things, now employed to as good advantage as is possible with the means at hand. It is the duty of the Army through its higher officers first, to represent to the people what, from a professional standpoint, is deemed necessary for the public defense, and if the people, through Congress, do not see fit to provide all that is represented as necessary, then it becomes all the more its duty to make the very best use of that which is provided. And that is the course now being pursued by the military establishment. The Army realizes that with its own numbers it could not hope to fight the country's battles, and it also realizes that under modern conditions of war, citizens without advantage of military training would, in the be-

ginning, be no help, because the enemy would allow no time for their organization and instruction. It therefore struggles with the means at hand to maintain itself at a high standard of proficiency, and at the same time to assist in building up an organized and instructed citizen soldiery that could be relied upon to help stay the first blows of war, until armies could be organized out of the raw material, and sufficiently instructed to be put in line of battle. So far as the details go the manner of carrying out these duties is not a matter for present discussion, but some features of the work may be mentioned. Fads and reforms sometimes run away with original designs. Too much should not be attempted. It is better to have say a hundred thousand good militia, than two or three hundred thousand that are not good. It is better to give a considerable degree of military instruction to, say twenty thousand school boys, than to give a very little to half a million. It would be unfortunate to bring military instruction into contempt by spreading it too thin.

But to return to the peace duties of the Army. It only remains to be said that the concentration of the Army at fewer and larger posts as now going on, will put it in better condition to carry on its life work than it has heretofore obtained. Drills, field exercises and theoretical instruction through the lyceums and the service schools at Forts Monroe, Leavenworth and Riley, can be better carried on; and the Army should stand high as a military body. Of recent years a Bureau of Military Information has been organized in the War Department, and through its labors a knowledge of the world's progress in the art of war can be stored for use when the time of its need comes. The Indian troubles are about over, and many details of military requirements can be carried out.

#### THE NECESSITY FOR AN INCREASE OF THE ARMY.

For nearly twenty years, last past, every successive Secretary of War and most military committees of the two houses of Congress have favored an increase of the Army. Mr. Samuel J. Tilden's dying admonition to his countrymen was to urge the imperative necessity for a proper system of sea-coast defense. Such eminent soldiers as Sherman and Sheridan and a host of others, have time and again called attention to the dangers that threaten this country from a neglect of the Army, and asked for such reasonable addition of soldiers as in their judgment would at least

partially remedy the evil. Now the significance of all this is simply that when any intelligent man of affairs, either statesman or soldier, is led by his duties to fully investigate the subject, the dangers of continued neglect of the military necessities of the country become apparent.

Speaking of the Army as an organization without reference to its external duties, it has been said that it should bend its talents and energy to bringing itself to the highest attainable standard of perfection; and this becomes all the more necessary by reason of its being a small army, which may at any time have large problems to solve. To attain that high standard it is necessary that the Army should be of sufficient strength to render it practicable to apply drill regulations and tactical problems and evolutions to a degree sufficient for intelligent demonstration of their uses in campaign and on the field of battle. As applied to this phase of the question nothing more forceful can be said than is found in the following quotation from the pen of Colonel Maurice, of the British army (*Encyclopædia Britannica*, vol. 24, p. 356), a military writer and student of the art of war of acknowledged ability.

"In any case, going back once more to the experience of the past, we are now at a time in these matters very like that which preceded the Peninsular War. The drill which was employed in the Peninsula was in all essentials worked out by Sir John Moore in a series of experiments conducted at the camp of Shorncliffe. No more important results were ever obtained by peace-training for war than those which were deduced from these experimental exercises. If we really reverence the great soldiers of the Peninsula, this is the way in which we shall honor them. We shall not do what they did not. We shall not accept the traditions of the past forms which are not adapted to actual warfare. We shall not write drill books in the study or bureau, and force field movements into conformity with them. We shall employ for the work of our great camps of exercise generals who have made an exhaustive study of the present conditions of warfare, and staff officers who can assist them in their work. We shall experimentally try 'those suggestions which have upon them any reasonably good stamp of approval by military men of skill.' We shall really and crucially investigate them, 'with opportunity afforded to proposers to meet difficulties that may be suggested.' 'Those proposals which can be defended from serious theoretical objec-

tions should be submitted to a few months' experiment in selecting regiments, and reported on as to their practical working in the essential points of simplicity and uniformity of manœuvre, adaptability to circumstances arising, maintenance of order, retention of unity of commands, rapid recovery of exact tactical form, and fire control. Then let authority take what is best, it may be adopting here one detail and there another.'"

This suggests an urgent need for a moderate increase of the strength of the enlisted force of the Army, as well as for the reorganization of the infantry arm, for with the present strength and organization it is impossible for the Army to engage in such practical instruction as is outlined by Colonel Maurice, and without which an army cannot reach the highest state of preparation for war. While we may never have an army of sufficient size to admit of such extensive field manœuvres as are annually carried on by the German and French armies, we could with a very moderate increase of strength carry out invaluable instruction on a moderate scale. In fact the present strength does not admit of a proper application of the ordinary drill exercises of companies and battalions.

But the necessities for an increase of the Army growing out of the actual demands of the duty which the Army may be called upon to perform would be the more readily understood and appreciated by the country at large. The first demand of that nature to be taken up for consideration is secondary in urgency to other demands, but should appeal strongly to the minds of all thinking citizens. It is found in the continued employment of the Army in relation to internal disorders in cases when the laws are "obstructed by combinations too powerful to be overcome by the ordinary judicial proceedings." Until human wisdom, growing out of experience, shall have arrived at a proper adjustment of the relations between collective capital and collective labor, as both have but recently come to be employed, strikes are inevitable, and without stopping to inquire into their merits—when the blame attaches to oppressive corporations, or when to unreasonable labor organizations—the fact remains that out of strikes will come riots, involving in their unlawful violence many otherwise good, but thoughtless men. Of socialists and anarchists, as a distinctive menace from their unaided acts, perhaps little need be feared in this country, but the following words of Judge Cooley suggest grave cause of apprehension



from their presence with us. The Judge says (*Forum*, September, 1894):

"Now, we have anarchists in our country; they submit to no government if they can escape it, even if to that end they must make use of the dagger, the bomb, or the torch; and they openly applaud this murder. They have gathering-places where by frantic appeals to passion and prejudice they seek to make converts to their doctrines; and when anything occurs to excite other classes to a temporary disregard of law, they are ever ready and willing to swell the ranks of discontent, and to give destructive effect, so far at least as they may with safety do so, to their hatred of government, not hesitating in some cases to take great personal risks.

"We justly look upon these men as foes to the human race, for their doctrines, if given full effect, would plunge us into a condition of worse savagery than history shows to have heretofore existed."

As here suggested the danger is that some day these anarchists will throw a fire-brand into an ordinary mob, in the way outlined by Judge Cooley, that will be snatched up by a Lord George Gordon and a Barnaby Rudge, and a whole city will go to ashes. It is not enough that we be able to subdue and punish those who should engage in any such unlawful acts, but every dictate of sound governmental policy, patriotism and humanity, demands that we labor to reduce to the minimum the chances of so dire a calamity. This can be done, in a reasonable measure at least, by being prepared to meet unlawful violence by lawful force—physical force. Does not this suggest a necessity for a reasonable increase of the Army? Heretofore the Army has without much difficulty suppressed such mobs as it has come in contact with in the line of duty. But it has accomplished this by moral force—not physical force. Mobs and law-breakers have yielded submission to it because it has represented to them the power and majesty of the United States. It has been to them an awe-inspiring symbol of national authority. How will it be when the spell is broken? And sooner or later it will be broken. Suppose the overwhelming numbers of the Chicago mob had turned on the small military force sent against them? Of course there is no doubt of what the final outcome would have been. The mob would have gone down, and in the end law and order would have triumphed,—at what cost of blood and treasure it is



sickening to contemplate. We want no such scars on the history of this free country.

Thus far nothing has been said concerning the National Guard of the various States as a conservator of the peace. The National Guard has on a great number of occasions performed invaluable service in quelling disorders and upholding law. It can and doubtless will do so in the future. But its greatest usefulness and efficiency in such duty is naturally with troubles more or less local in their nature and existence, and coming under state jurisdiction. For instance, the unfortunate troubles of last year were so widespread, of so peculiar a character, and withal so alarming as to the number of men who allowed themselves to become committed to unlawful acts either by actual participation in such acts, or by a manifest willingness to join in them in certain contingencies, that it could not be claimed that it would have been the part of wisdom to rely upon the National Guard to uphold the law under such circumstances, and in the face of the dangers of so grave a nature and extent. It was a most fortunate thing that the President found a way to send National troops direct to the various scenes of trouble without allowing them to be tripped up by State lines. And it was another fortunate thing that the discovery was made that it would hardly be possible for mob violence of any magnitude to take place without violating the laws of the United States. But, aside from all this, it is not the part of good policy to use the National Guard in such duty more than can be helped. National Guardsmen, when not in uniform in actual performance of a military duty are civilians. While law-breakers and rioters as a class, are not entitled to a great deal of consideration, yet the nature and character of many disorders are such as to enlist on the part of the law-breakers a considerable share of the sympathies of the surrounding community. Now, without going into much of a discussion of this phase of the question, it is well to remark as we go along that it would be better policy not to subject the National Guard to such embarrassing duties as that of shooting at their neighbors.

In regard to such Indian outbreaks as may hereafter occur—and many are liable to occur—the present strength of the Army is ample to successfully meet them.

We now come to consider the question of a necessity for an increase of the Army for war purposes. The necessity for an increase of the Army on account of police duty has been classed

as secondary to the necessities for its increase as a preparation for war. The two duties are not really comparable; they are of a different nature, each having its own peculiar demand. Whilst the Army may be too small to properly guard the internal interests of the country from dangers of unlawful disturbance, the damage resulting from its inadequacy could be remedied by calling to its aid other help, for it would be numbers, not organization and discipline that the Army would have to overcome, and such help as it could get would be as efficient, man for man, as would be the lawbreakers it would have to subdue. But not so in war. All Europe is a military camp. All the great powers, and some of those that are not great, are organized, armed, equipped, drilled and ready to march to the field of battle at the word of command. Should war occur we would have no time for preparation. We would have to meet its first blows with such organized force as we happened to have. And for that reason the ready strength of the Army carries more importance in relation to war than it does to police duties.

It has been said that our policy of non-intervention in the politics of the world is one-sided, in that it binds no one not to interfere with us. But if we aspire to become a great factor in the world's commerce, as the building of warships and our desire to revive a merchant marine indicate, can we rely upon keeping out of international complications? Can we rely upon keeping out of them in any event? We already have one hand on the Sandwich Islands, an eye on the Nicaragua Canal route and another on the affairs of South America, and many of our citizens are winking both eyes at the insurgents in Cuba while fifty thousand European soldiers are there trying to suppress the insurrection. (Within the last quarter of a century Spain has sacrificed over two hundred thousand soldiers to the battle-fields and climate of Cuba—but little over three cannon shot lengths of our shores.) The Fur Seal of Behring Sea, retiring and inoffensive as he appears, came near involving us in most serious trouble—even the possibility of war—but a short time ago. It is even reported that we now have some misunderstanding with England growing out of the boundary question of Alaska, and the expected reply of Lord Salisbury to Mr. Olney's note in relation to the Venezuelan dispute may not satisfy the Monroe doctrine. Russia, powerful and ambitious—to all appearance the coming great power of the world—has worked its way across

the continent of Asia, and has become our neighbor. Japan, but recently waked from its slumber of effete civilization, has buried its own corpse and stepped forth a young and vigorous nation. It has had its first taste of blood, and like all animals, whether biped or quadruped, has but had its appetite whetted for more. All Europe is armed and ready for war at any time. A few days ago the German emperor was quoted as saying to an American naval officer: "You are building those ships to fight England." The British lion has his claws all over the American continent. He has an ally of five million stalwart Anglo Saxons stretched from one end to the other of our Northern frontier, with the great St. Lawrence to float his largest ships of war well to our rear, and canals by which his gunboats can reach Chicago and Duluth. He has a line of strongholds and fortifications all the way from Quebec, Halifax and Bermuda, passing down our Atlantic seaboard scarcely out of sight of our land, and on around South America. He has also a naval station and fortifications at our back door on Puget Sound. These fortified strongholds are kept manned and supplied—for what? But let us hope that the German emperor was wrong in his prediction. All this may not suggest the probability of our becoming involved in war in the near future, but it does most certainly suggest the possibility of our becoming so involved at any time. Thirty-one years is the longest peace period we have ever enjoyed. It is now over thirty years since we last sheathed the sword.

We boast of being a peaceful nation—are we? Let us look to the record. From 1775 to 1875 we devoted one-sixth of our time to war. Think of it, an average of five days out of every month for a hundred years! From the beginning of this century to the present time, we have spent over one-tenth of our time at the trade of war, and during the last eighty-five years have, with possibly one exception, carried on more warfare than any of the great nations of Europe, or of the world for that matter. And all this in addition to our Indian troubles, which are an offset for desultory fighting of Europeans on the continent of Africa and in the remote corners of Asia. In the four years of the War of the Rebellion this country, North and South, sacrificed more men on the field of battle than have the British Isles in all their wars since the days of William the Conqueror. In one century of our existence we have made more use of the military arm of the Government in suppressing internal disorders than has England in all the time since the Monmouth Rebellion. About thirty years

ago we sent an army to the Rio Grande preparatory to kicking a scion of the House of Hapsburg and a European army off this continent. And we would have done it had not the threat answered for the deed. From first to last we have enrolled about five millions of our citizens for war purposes (including the Confederate armies). It seems that we keep the peace very much after the manner of Mark Twain's friend, Mr. Buck Fanshaw, late of Virginia City, Nevada. Mr. Fanshaw was preëminently a man of peace. He couldn't tolerate rows, and when he saw one going on he quietly and unostentatiously took his six shooter and proceeded to convert the rioters into corpses. But tradition has it that finally, in the confidence of self-conceit, Mr. Fanshaw fell to neglecting his six shooters. He is dead. And yet with this record before us we can truthfully and safely boast that at no time and under no circumstances, not even in the midst of the excitement, gloom and doubt precipitated by the assassination of Lincoln in the presence of a million victorious soldiers under idolized leaders, have our free institutions been in danger from the hands of the Army.

It has not been the intention, in preparing this paper, to go extensively into details. Statistical information concerning wealth, commerce, population, and kindred subjects, as well as the politics and policies of the nations of the world, are matters of daily discussion in the public prints, and introduced here would only tend to burden the mind with useless repetition of that which the reader already knows. Do the conditions surrounding the United States indicate a possibility of our becoming involved in war with a foreign power? And if so should the Regular Army be increased before war is upon us in order that we may be better able to meet it? And if answered in the affirmative, how much should we increase the Army becomes another question. Assuming that the conditions do indicate that we may be forced into war, and that it is necessary to increase the Army to meet such a contingency, the last question will be discussed. First let us see what the strength of the Regular Army has been in the past and how it stands to-day in relation to other armies. For convenience in discussing these matters the tables on pages 21 and 22 may be of convenient reference.

These tables show the strength of our military establishment, as compared to that of any of the great European powers, to be so insignificant as to really destroy the force of comparison; one

TABLE I.—UNITED STATES, 1790-1895.

Year.	Strength of Army.	Population.	Number of population to each soldier.	Number of soldiers per million of population.
	In peace			
1790	672	3,929,000	5,847	224
1800	4,051	5,308,000	1,310	810
10	6,886	7,500,000	1,089	983
20	8,686	9,634,000	1,109	965
30	5,951	12,866,000	2,162	496
40	10,570	17,069,000	1,615	622
50	10,763	23,192,000	2,155	468
60	16,367	31,443,000	1,921	528
67	56,815	*35,000,000	616	1,623
70	37,075	38,558,000	1,040	976
80	27,605	50,156,000	1,817	552
90	28,110	62,622,000	2,228	453
95	27,897	*70,000,000	2,509	398
	In war			
1814	38,186	*8,000,000	210	4,773
47	21,686	*20,000,000	922	1,084
65	22,310	*33,000,000	1,479	676

\* Estimated.

1895- { Area of United States : 2,970,000 square miles.  
 { Population per square mile : 23 57.  
 { One soldier to each 106 square miles.

TABLE II.—PRINCIPAL NATIONS, 1895.

Country.	Army.		Population.	Area Square Miles.
	Peace Footing.	War Footing.		
United States.....	28,000	143,000	70,000,000	2,970,000
Austria-Hungary.....	354,000	1,900,000	41,350,000	240,000
Canada, Dominion of.....	*38,000	.....	4,860,000	.....
France.....	564,000	3,200,000	38,340,000	204,000
Germany.....	579,000	2,500,000	49,400,000	208,00
Great Britain and Ireland.....	154,000	660,000	38,770,000	121,00
Italy.....	282,000	1,400,000	30,720,000	110,00
Japan.....	77,000	260,000	41,385,000	147,00
Mexico.....	37,000	160,000	12,080,000	750,00
Russia.....	843,000	2,500,000	119,000,000	8,600,000
Spain.....	80,000	170,000	17,670,000	194,000

\* Militia.

might as well try to measure a gas jet by the sun. They also disclose the less generally known fact that at the present time, with our per capita wealth many times greater than it was in the ante-bellum days, our army is much smaller as compared to the population than it has been since 1790. At the same time European armies are to-day better organized, better equipped for war, and

TABLE III.—PRINCIPAL NATIONS, 1895.

Country.	No. Population to each Soldier.		No. Soldiers per million of Population.		Population per Square Mile.	No. Square Miles to each Soldier.	
	Peace.	War.	Peace.	War.		Peace.	War.
United States .....	2,464	493	406	2,029	23.23	106.07	21.21
Austria-Hungary .....	117	22	8,634	46,341	172.29	.68	.13
Canada, Dominion of .....	128	...	9,500	...	...	...	...
France .....	68	12	14,842	84,211	187.94	.36	.06
Germany .....	85	20	11,816	51,020	237.50	.36	.08
Great Britain and Ireland .....	252	59	4,053	17,368	320.41	.79	.18
Italy .....	109	22	9,400	46,677	279.27	.39	.08
Japan .....	537	159	1,878	6,341	281.53	1.91	.57
Mexico .....	326	75	3,083	13,333	16.11	20.27	4.69
Russia .....	141	48	7,084	21,008	13.84	10.20	3.44
Spain .....	221	104	4,706	10,000	91.08	2.43	1.14

TABLE IV.—WARS OF THE UNITED STATES.

Statement of the Number of United States Troops Engaged.

Wars.	From—	To—	Regulars.	Militia and Vol'nt's.	Total.
Northwestern Indian Wars .....	Sept. 19, 1790	Aug. 3, 1795	.....	.....	8,983
War with France .....	July 9, 1798	Sept. 30, 1800	.....	.....	*4,593
War with Tripoli .....	June 10, 1801	June 4, 1805	.....	.....	*3,330
Creek Indian War .....	July 27, 1813	Aug. 9, 1814	600	13,181	13,781
War of 1812 with Great Britain .....	June 18, 1812	Feb. 17, 1815	85,000	471,622	556,622
Seminole Indian War .....	Nov. 20, 1817	Oct. 21, 1818	1,000	6,911	7,911
Black Hawk Indian War	Apl. 21, 1831	Sept. 31, 1832	1,339	5,126	6,465
Cherokee Disturbance or removal .....	1836	1837	.....	9,494	9,494
Creek Indian War or Disturbance .....	May 5, 1836	Sept. 30, 1837	935	12,483	13,418
Florida Indian War .....	Dec. 23, 1835	Aug. 14, 1843	11,169	29,953	41,122
Aroostook Disturbance .....	1836	1839	.....	1,500	1,500
War with Mexico .....	Apl. 24, 1846	July 4, 1848	30,954	73,776	104,730
Apache, Navajo & Utah War .....	1849	1855	1,500	1,061	2,561
Seminole Indian War .....	1856	1858	.....	3,687	3,687
Civil War .....	April, 1861	August, 1865	.....	.....	2,772,408
Total .....	.....	.....	.....	.....	3,550,605

\* Naval forces engaged.

larger than they have been at any time in the history of Europe. But striking as these figures are, they fail to impress their full significance on our minds, for it is difficult for us to realize that the lack of preparation for war, should war come, is vastly more potent of disaster to-day than it was, say in 1861, going back to our own

last experience. But even that experience teaches little, for in the start the opposing armies were equally raw. It is only the old veteran of the war who can realize what would have been the fate of the army of Bull Run in the face of a fourth of its number drawn from the armies of Grant or Lee in 1864. And yet the Bull Run army had over two months' time for organization and training; while now it would not be allowed as many days for preparation were it in Europe, and, as it is, it would only have such time as the enemy would require in crossing the ocean. Several causes have worked the change; among them the invention and improvement of arms and ammunition, and all mechanism of war, which increases many-fold the destructive power of a given number of men; the increased facilities of transportation, which enable armies to be placed almost instantly in the proposed theatre of operations; and what is of still more weight is that the military powers hold in barracks immense armies under the most complete organization and fully equipped in these respects. Every demand for war, not only of soldiers and equipment, but of worked-out plans of operations, are at all times ready for immediate application. To be prepared for war in the European sense of to-day means—literally not figuratively—that war declared Monday would be followed by a million trained soldiers in march for the battle-fields Tuesday.

We are helplessly unprepared to meet these conditions; but happily we need not be prepared, for the oceans intervene to prevent the possibility of our ever being overwhelmed by one of these immense engines of modern war. What we may have to meet, however, and for that we are also discouragingly unprepared, is such a part of one or more of these armies as could be transported to our shores in ships. It is estimated that England holds at home about seventy-five thousand troops in readiness for foreign war; her navy is beyond comparison the most powerful in the world, and in war with us would have the advantage of fortified strongholds and coaling stations at Quebec, Halifax, Bermuda, in the West Indies, and at Esquimaux at the entrance to Puget Sound. Canada would be an ally of England. That is not all: history teaches us that England usually carries on her wars with brains, money and other people. If we should become embroiled in war with her it is almost certain we should find her with some ally, great or small, who could furnish any number of soldiers that ships could carry to America. With the other powers, means



of transport and naval force would be the controlling consideration, for there is practically no limit to the strength of their armies. In other words the carrying capacity of available ships would put the limitation upon a force to be sent against us by one or more of the European powers. What this limitation would be is more or less a matter of conjecture. It is conceded however by military men who have given the matter thought and investigation, that an army of at least seventy-five or one hundred thousand, with the supplies and ordnance necessary to carry on modern war, could at once be landed on our shores. Of course the fleet of transports would be under strong naval convoy, and until our own navy is considerably increased and sea-coast defenses are built, there would be but little difficulty on the part of the enemy in effecting a landing; at what point it is not possible to predict.

Now, no matter how we look at the problem, even if we view it through the ultra pessimistic atmosphere with which some army officers are wont to envelop our military policy, the most we have reasonable cause to apprehend from foreign land forces is a sudden blow by an army of about one hundred thousand—and such augmentation of that force as could be sent against us before we could pull ourselves together ready to fight. It is conceded that combinations could be made by which we would be menaced by a great force, but such a contingency is remote. If, then, we be prepared to meet the first blows of a hostile army of about one hundred thousand, we may rest in reasonable security so far as our military necessities depend upon land forces to meet land forces. (The construction and manning of sea-coast defenses is another phase of the problem.) But it is obvious that we are not now prepared to meet, even on our own soil, a well-appointed modern army of seventy-five thousand. Our army is put down as twenty-eight thousand, inclusive of officers and men. But from this would have to be deducted a considerable number as non-combatants, and many points, such as arsenals, depots, sea-coast defenses, etc., would demand large deductions, so that fifteen thousand is about the strength with which the army could confront the enemy. The paper strength of the organized militia (National Guard) of the several States shows one hundred and fifteen thousand officers and men. After making due allowance for inefficient or inaccessible organizations, and for individual guardsmen who from various causes would not respond, it would be a good showing if the President's call brought to the colors

fifty per cent. of the total force, or say sixty thousand National Guardsmen. This would give a total army of about seventy-five thousand officers and men. Many of the National Guard would be efficient for good service; some would be lacking in drill, with discipline but fair; and a large proportion would be of little service until they could be brought into shape after being called out. In the confusion of improvised organization, this mixed force would be but fairly effective until seasoned by a little service. The enemy would be picked troops from the most highly trained armies that the world has ever seen. As the Englishman would say: "There is no use blinking the question," we need to be better prepared to meet even such an emergency. So far as concerns the demands of a war to be carried beyond sea or with Europeans in Central or South America, little need be said. At present our navy and shipping are not such as to afford a safe convoy of a large army across the waters, and should the necessity of such a war threaten, we would have to possess ourselves with patience. Perhaps troops for such a purpose could be prepared for service as rapidly as could the means of placing them in the proposed theatre of action. The real army with which we will carry on our wars will be drawn from the ten million of arms-bearing people of this country when war is upon us. With this army we would finally triumph. The mission of the Regular Army and the organized militia is to hold the first line as above outlined, until the levies could be organized and receive some degree of instruction; and lack of preparation to thus "hold the fort" would cost us dearly.

With those who have given the subject intelligent study in the light of modern military conditions it is an unquestioned fact that our peace establishment is too small to meet these demands, and that should the crisis ever come disaster and humiliation beyond the measure of money would be the penalty of neglect. Prussia defeated Austria in a six weeks' campaign—Prussia was prepared for war, Austria was not. At the end of a seven months' war France was abject at the feet of Germany, despoiled of her provinces and compelled to pay to her conqueror the cost of her own humiliation—Germany was prepared for war, France was not. Yet France and Austria were infinitely better prepared than we are now, and under equal conditions their troops, man for man, would be as good as those of Germany. The hordes of China were as chaff before the wind in the face of Japan's organ-

ized and disciplined army. Time between declaration of war and commencement of hostilities has been annihilated—long wars are things of the past—unorganized enthusiasm had a relative force in the old days of short-range muzzle-loaders, but in the face of modern military mechanism it is powerless. Americans make the best soldiers in the world, we have ten millions of arms-bearing people from which to draw armies, and we could whip any nation on earth—if that nation would give us time to get ready—but “there’s the rub.”

Now there is another side of our military weakness which calls for more men: the sea-coast defenses. General Abbot, one of the ablest and most accomplished officers of the Corps of Engineers, says (*JOURNAL MILITARY SERVICE INSTITUTION*, May, 1894):

“What, then, are our real needs in the way of coast defense? The United States has an immense seaboard, exceeding 3000 miles in length on the Atlantic and Gulf coasts, and half as much more on the Pacific, not including Alaska. \* \* \*

“The United States has also extensive water frontiers on the great Lakes and at Alaska. \* \* \*

“Upon the whole extent of the Atlantic, Gulf, and Pacific coasts there are about thirty ports which demand local protection for their cities, now exposed to occupation or destruction, and of these about a dozen are so important as centres of commercial wealth that the entire country has much at stake in their security. Nine out of this number are also important as containing naval stations and depots of supply, without which our new ships of war would be unable to keep the sea or perform any service in war; for it must not be forgotten that naval bases are as indispensable in these days of steam as are bases of supplies for armies in the field. In fact, this statement hardly puts the matter strongly enough, for our new ships would be exposed to capture and used against us, if they should attempt to operate on their natural element, the ocean, without ports of refuge in which to find security when overmatched.

“Besides these thirty ports now urgently demanding protection there are about seventy others whose local importance would justify inexpensive earthworks; which, armed with the best of our old type of ordnance, and having in view the small inducements offered to an enemy to attack, would afford the needed protection. \* \* \*

"This Board recommended the expenditure of \$93,448,800 for land defenses and their armament." \* \* \*

This work is progressing as rapidly as congressional appropriations permit. It is estimated that when completed, these defenses would require seventy to eighty thousand men to man them in time of war. In that event volunteers and militia would have to be relied on to the larger extent, but in time of peace their care, and the necessity for the training of a large number of artillery officers and men for them, will require a considerable increase of the present strength of the artillery arm of the service. In fact, all conditions considered, it seems obvious that our greatest danger is to be apprehended from naval attack, and therefore increase of the artillery becomes of the first importance.

#### HOW MUCH SHOULD THE ARMY BE INCREASED?

In his annual report for 1893 Secretary of War Lamont said:

"The effort to maintain a maximum numerical military strength in which foreign powers are engaged is only of remote interest to us. Any considerable increase in the numbers of our army would not meet with popular favor, and is not suggested by any contingency, immediate or remote. What is desired is a maximum efficiency of the organization, sufficient elasticity to respond readily to any probable tension, the acquisition of the mechanism of warfare in adequate quantity and of the best quality, and such dissemination of military instruction as will enable the Federal Government, in the event of war, to summon for the purposes of immediate defense a body of its citizens, not unfamiliar with the rudiments of military discipline and service, sufficient until the great armies which exist in embryo in our free citizenship can be enrolled, organized, and put in the field."

Many officers in the Army whose opinions are entitled to great respect, not only on account of their rank but also because of their high standing and professional knowledge, and also many distinguished gentlemen in civil life, advocate a very considerable increase of the strength of the Regular Army. But, all the demands and conditions considered, our safety from being overrun as it were by the great armies of Europe, but not forgetting a due measure of danger from such a source, and keeping in mind our traditional dislike of standing armies, and at the same time looking at the question in a business light, regarding money spent on the Army as so much paid for the insurance of the peace, honor

and dignity of the country as well as of property, it seems that a very moderate increase of the force would meet the interests of the people. In that view, and taking Secretary Lamont's report, above quoted, as a text, we will first consider the conditions which seem to demand an increase as outlined in this paper. First: The internal needs of the Army—that which is needed to make it a perfect machine for the work it may have to do. This demand is not great. Second: The duties that may and will be required of the Army under the orders of the President, in suppressing internal disturbances. This demand is difficult of determination. We really have no data by which to judge, for, as heretofore said, the Army thus far has suppressed mobs by moral force. What the Chicago mob of last year could and would have done had it really resorted to forcible resistance in its full strength of frenzy, is not known. It seems certain though, that in consideration of the other troubles then existing, the Army would have been wholly inadequate. Third: The demands of war. This is also in a certain degree an indeterminate quantity, and may go hand-in-hand with the needs of police duty. Fourth: The sea-coast defenses. Increase for this purpose is especially urgent, and as the defenses progress it will become a necessity.

Now, in consideration of all these demands, allowing a due limitation on account of the expected continual improvement of the strength and efficiency of the National Guard, if we adopt a policy of maintaining a Regular Army with its minimum strength at a fixed ratio of five hundred soldiers to one million of population, and with such expansive organization as would allow the enlisted force to be quickly increased fifty per cent., it would probably be a reasonable compromise between an ideal army and the present insufficient force. In round numbers this would give us now an army of thirty-five thousand officers and men, and hereafter periodical increase to that ratio should be made say every five years.\* In making the first increase under such a system, only such officers as are necessary to a proper organization of the line of the Army should be added. What is just now needed is an increase of the force of enlisted men. But thereafter, in the

---

\* Since this proposition for a fixed ratio of soldiers to population was written, newspaper accounts indicate that the Major General Commanding the Army has recommended the same policy. The full report has not been seen by the writer, and it is not known what strength for the Army it recommends, and therefore comment on it has not been thought advisable.

periodical increases, organizations should be added to the fighting force of the Army. The staff is now larger than really needed if it be considered wholly in relation to the Army itself, but considering the mission of the Army in war it is doubtful if it would be wise to cut it down to the bare necessities of the internal needs of the peace strength of the Army. Reference has been made to the necessity for the Army to maintain itself at the highest possible standard of efficiency, and be ready at all times to properly render its full duty in case of war, not forgetting that this duty would at once become one of grave responsibility and vital importance to the country. Now, to enable the Army to fulfill these duties, the conditions of promotion should be such as to admit of officers arriving at positions of rank and responsibility before they pass the prime of military life, keeping in mind that most successful soldiers have been young men. It is not enough that under any system—even our present one, which finds officers after twenty-eight years' service still lieutenants—there will be young men in the Army. What would be needed for war would be young men of experience in command and other responsibilities. A system of periodical increase would be a material help in this way, and would thus not only increase the numbers in the Army, but would also increase its relative efficiency.

If the Army needs increasing at all, certainly a fixed ratio of five hundred soldiers per million of inhabitants is so moderate as to need no defense on the score of cost. For the sixty years ending with 1860 the country supported the Army at an average peace strength of about seven hundred soldiers per million of inhabitants (not counting the war periods of 1812-15 and 1846-48, during which there were much larger forces). At that ratio we would now have an army of about forty-nine thousand, and even if we had a greater force than that, we could much better afford it than could our fathers afford the army they maintained. At best an army is an expensive necessity somewhat in the nature of fire insurance. If the merchant could be assured that fire would never invade his premises, he would be foolish to pay for insurance; and if the Government could be assured that it would never need soldiers, it would be waste of the people's money to keep an army. But neither can have such assurance, and parsimony may cost the one hundreds of thousands and the other billions of dollars, while prudent expenditure of thousands by the merchant or millions by the Government would have averted the loss.

But here the parallel ends. Insurance only insures remuneration for loss by fire, and exercises no influence in preventing its taking place. An efficient army not only insures safety from absolute disaster should war occur, but it is the most potent of all agencies in preventing war. In his first term of office President Grant announced what he called a peace policy towards the Indians—it was a dismal failure. If President Grant had applied to statecraft the wisdom General Grant applied to warfare, he would have realized that at that time nothing short of two hundred thousand soldiers distributed in actual sight of the Indians could have insured a peace policy. It is so with rioters, insurrectionists, or nations. If the whiskey rioters of 1794 had thought that the government officials could have called on Fort Pitt for two or three hundred soldiers instead of knowing that they could get no more than eleven, it is doubtful if the insurrection would have taken place. And if we would pronounce the Monroe doctrine with conclusive emphasis and yet without war, it must be known that if needs be we are at all times prepared to italicise it with bayonets.



## THE SCHOOL AT FORT RILEY.

BY CAPTAIN JOHN C. GRESHAM, 7TH U. S. CAVALRY.

COMBINED action of cavalry and light artillery has long been recognized as a potent force in war, and for more than a century much study has been given to its development. Conceiving the idea of a school of practice for the two arms, General Sheridan thought Fort Riley the best place for its establishment. A fine reservation of 19,900 acres, embracing more than thirty square miles of varied ground, is well adapted to illustrate military operations. This large post, one of the finest in the service, is situated on the Kansas Division of the Union Pacific Railroad, and exclusive of Alaska, is the geographical centre of the United States. Within the last ten years more than a million dollars have been expended in buildings and improvements, and Fort Riley can now boast of nearly all modern comforts and conveniences. So complete is the change, that the post established more than forty years ago would not be recognized by its founder. Abundance of water of surpassing excellence is pumped from eight Wagner tubular wells into a reservoir of 500,000 gallons capacity, and together with a good sewer system places the sanitary conditions of the post beyond complaint. Quarters and barracks are heated by steam supplied by a large plant of seven boilers. Thousands of trees have been planted and with the handsome grounds give the appearance of a beautiful suburb of a large city. By direction of the Secretary of War in pursuance of Act of Congress approved January 29, 1887, a school of instruction for drill and practice for cavalry and light artillery has been established at Fort Riley, Kansas. In the original scheme of 1892, it consists of one regiment of cavalry (as nearly as practicable), such batteries of light artillery not exceeding five, as may be convenient, and such other officers and enlisted men as may be assigned to duty at the school. The troops of each arm constitute a sub-school with its own director; and the colonel of the cavalry regiment is commandant of the whole school. The commanding officer with the field officers of cavalry and artillery form the school staff, and the adjutant of

the cavalry regiment is secretary. The principal object is instruction in the combined operations of cavalry and light artillery, but one-half of the year is devoted by each sub-school to the special duties of its own arm with the addition of signalling with flag, torch and heliograph, and military telegraphy. The other half of the school year is given to field exercises of the two arms combined. Late in 1892, the above plan was modified, so that the cavalry, instead of belonging to one regiment, is composed of three squadrons, of four troops each, from different regiments; and one squadron must be relieved each year. The commandant is, now, a colonel of cavalry, assisted by one lieutenant colonel, three majors, and one lieutenant as secretary. Each troop is to have, as nearly as possible, its full complement of officers. The school year beginning January 10, ends December 20; and nine months are devoted to *separate* instruction, while the rest of the time is given to practical problems and *combined* manœuvres dependent thereon. Colonel James W. Forsyth, Seventh Cavalry, now Brigadier General, U. S. Army, was charged with the execution of this scheme, and, assisted by the directors of the sub-schools and the secretary, performed the task with remarkable success.

As the principal object is to train cavalry and light artillery, and, incidentally, the Hospital and Signal Corps, in everything that pertains to field duty in war, all theoretical and practical instruction has this end in view. Like all military posts, Fort Riley has its lyceums, but as they are not peculiar to the school, nothing need be said of them here. Four officers, six non-commissioned officers, and forty privates of the Medical Department form a well organized school, where young officers and enlisted men are sent for theoretical and practical instruction in their profession, and whence, on being relieved, they are sent to all parts of the army. Among the enlisted graduates of this school are practical druggists, nurses, drivers, cooks, carpenters, and men qualified to do any work required in the medical department of an army. Four men of each troop and battery are under constant training in all that pertains to first aid to injured, and would form a corps of invaluable assistants in battle, as was illustrated at Wounded Knee. The following course of practical and theoretical instruction is now pursued in the Medical Department of the school: Drill in the settings up. On completion of these exercises, there are lectures every day, except Saturdays and Sun-

days, on first aid and anatomy. Lectures on instruments every Monday; on nursing, Tuesdays, Wednesdays and Thursdays; bandaging, daily, except Saturdays and Sundays. Five days in the week, on completion of above course, are drills in first aid. These drills embrace thorough practical instruction in all that has been imparted in lectures. A novice attending one of these drills could easily imagine he was in a field hospital, and that the soldiers brought up on litters were actually wounded and fresh from the carnage of battle. Each man is assumed to be wounded in a different place and manner; dressings are carefully inspected, and numerous questions put as to nature of injury, reasons for this or that method of dressing, manner of lifting and placing patient, etc. And most remarkable of all is the prompt intelligence shown in answers to such varied questions. Then follows a course of one month in the wards of the post hospital, where each pupil is required to rely on himself and practice what he has learned. Those who show aptitude in pharmacy and dispensing are now placed in the dispensary and given a two months' course of lectures and practical instruction in that department. The company and hospital kitchens are utilized for instruction in cooking. Out of funds appropriated for the purpose materials are purchased, and men selected on account of aptitude, are required to construct the various dishes suitable for the regular diet of a hospital or for the special diet of any patient. The post ambulance service is used to train certain men in driving and care of animals, while certain others are taught the use of tools in the carpenter's shop. At the end of the first three years 120 men had graduated, and been sent out to the different posts of the army.

An officer and thirteen sergeants of the Signal Corps form a similar school for that branch of the service. The following will show the kind of instruction. The course is divided into two divisions, theoretical and practical. The theoretical embraces the following subjects: Electricity, Surveying, Topography, Photography, Signalling, Instruction to Operators. In electricity, the theoretical instruction is imparted by lecture and recitation, and comprises the general principles of electric and magnetic potentials and circuits, primary and secondary batteries, electrical measuring instruments, their use, the systems of the Morse, Duplex and Quadruplex telegraphy, construction and maintenance of telegraphic and telephonic lines, and subjects of telephony. The

theoretical course in surveying, topography, and photography, embraces the various operations of surveying and map-making, and the principles of photography. Instruction to operators is given by recitations in "Instructions to Operators" issued by the chief signal officer. The practical course in electricity consists of laboratory work with the different electrical measuring instruments, the construction and repair of all apparatus used by the corps, erection of telegraph and telephone circuits, construction of the flying field telegraph line, and location of faults of telegraph and telephone lines, together with daily telegraph practice. In surveying and topography, the practical course includes the making of notes for reconnaissance, and preliminary surveys, with their reduction to maps, and a simple triangulation of the country with a reduction. In photography, the pupils are required to make exterior and interior exposures, to develop them, print negatives in all the various ways, and to copy, enlarge and reduce. There is also drill with the captive balloon.

In the combined manœuvres blue uniform with forage caps, and brown fatigue clothing with campaign hats distinguish the opposing forces, which are assumed to belong to blue and brown armies operating in the vicinity of Fort Riley. Full reports with topographical sketches as to each day's work are rendered within twenty-four hours. Marching orders are known only to the side they concern, and the strength, movements or designs of the enemy must be discovered by constant and vigilant use of the regular means resorted to in war. The Hospital Corps gives simulated aid to every kind of assumed injury, while the Signal Corps renders assistance of real and often of prime importance. On each side are prying umpires charged with seeing every movement and making decisions. Their judgment is final, but must be governed by military principles, and by certain conventional rules found necessary in these mimic hostilities. The substance of a few of these rules is here given. Each umpire wears a white band on left arm. Firing must cease at sixty yards. Umpires must be early on the scene, and, in adjudging the result must consider dispositions, execution of attack, and relative strength at point of collision. But actual collision must be prevented in all cases; for when an exercise has reached the stage immediately preceding the crisis it is plain nothing short of real battle and bloodshed can decide the question of victory or defeat.

At this stage, then, the umpire will give the signal to suspend

movements. Cavalry charges must end eighty yards from the enemy; and cavalry failing to meet charge with charge is defeated. When equal bodies of cavalry meet in the charge, victory belongs to the one bringing up the last formed reserve. When moving, unlimbering, or limbering, unsupported artillery is at the mercy of a cavalry attack made within four hundred yards. When the flank of dismounted cavalry is turned by a like force, retreat or change of front must be made before the enemy has delivered a heavy fire at four hundred yards or less. There are other rules, but enough have been given to show the nature and importance of all. The written reports of manœuvres, especially those showing decisions of umpires and comments of commandant, are a very interesting and valuable feature of the school. In his last annual report, General Forsyth says: "The rendering of these reports is considered one of the most important auxiliaries for securing instruction in an indirect manner." They were all of an excellent character, displaying great interest in the work, and a keen appreciation of the merits and defects of actions had or observed. All such papers with maps, itineraries, etc., are kept where they may be readily examined by officers and men, and give rise to animated discussions that vary with the manœuvres but end only with the campaign. In his report on the sub-school of cavalry for 1893, Colonel Carpenter says: "Officers and men showed great interest, and performed the duty assigned them in a very successful and satisfactory manner." In reporting on the artillery school, Major Randolph declares: "The combined operations of the two arms held this year (1893) have been replete with interest, and have been more instructive than any other part of the year's work. Both officers and enlisted men entered heartily into the spirit of the thing, and thoroughly appreciated the welcome change from the ordinary monotony of perpetual drills. The successful inauguration of this system, which is the principal object of the school, is a long step forward in the development of a valuable practical course, such as can be obtained nowhere else in the country." An accurate notion of the amount and character of work done in these manœuvres could only be had by reading the official reports pertaining to them all; and would involve the perusal of a large volume.

## SOME OBSERVATIONS UPON THE SIOUX CAMPAIGN OF 1890-91.

BY FIRST-LIEUT. W. P. RICHARDSON, 8TH U. S. INFANTRY.

**I**N announcing the subject of the present paper, I feel that a few words of explanation are necessary. The subject was chosen partly by request, and with the belief that a paper upon this campaign would not be without interest. My object will be, not to present a history of the campaign, but to furnish rather some brief sketches drawn from my own experience of that period, together with some observations upon the causes which led to the so-called outbreak, and upon its chief incidents. I shall to a certain degree take the Indians' side of the question, and will first ask your indulgence toward a few general remarks upon the character of the Sioux, and upon their history prior to this time.

The Sioux Nation, comprising some twenty different tribes, with six agencies, numbers, according to the census of 1890, about 24,000, with approximately 5000 warriors. Their men possess generally fine physiques, with no lack of personal courage, and in their intellectual qualities compare favorably with those of most other nations. In morality, they are said to be above all other Indians of the plains. They represent to us all that which is most warlike, courageous, and independent among the Indians we have had occasion to deal with in modern times, and in our various encounters with them they have rarely failed to win our respect so far as fighting qualities were concerned, and in the results we have on our side little cause for congratulation. In the ability, as well as dignity, of some of their leaders, such as Red Cloud and Spotted Tail; in their skill and cunning in warfare, in their organization for offense and defense, and in their successful resistance for so long to subjugation, they represent in the Indian history of the century, though perhaps in a less marked degree, the characteristics and the supremacy of the allied Iroquois in the early days of New York State and the adjacent region. The Sioux, even in those times, judging from the meagre accounts which have come down to us, held this supremacy



in the northwest over most of the neighboring tribes. No other tribe, unless it be the Northern Cheyennes, equals them in courage, endurance, and intelligence. They are said to be allied linguistically to the Iroquois, and while this fact has no special bearing upon the subject of this paper, it is interesting to note that there is no evidence, which I have been able to obtain, showing that the latter in pursuing their career of conquest westward, ever trespassed upon the domain of the Sioux, although reaching almost to its very boundaries. Their own aggressions to the eastward, later, were successfully resisted by the Chippewas, a branch of the Algonquins.

The Jesuits entered the Sioux country as early as 1680, but our negotiations with them as a government did not begin till 1815. From that time until recently they have been almost constantly on the move, and as treaty after treaty compelled them to yield lands wanted for settlement by the whites, there followed increasing discontent and frequent hostility on the part of the Indians.

It would make a most interesting chapter of Indian history, though quite beyond the limits and design of this paper, to review the incidents of their contact with our first adventurous explorers and settlers down to the time when treaties began, through the misunderstandings and growing hostilities which followed, through the bloody scenes of 62-63, and through the various campaigns of the 70's, down to this last effort to protest by force of arms against their real or imaginary wrongs. Through all this time, one fact is prominent: they have, notwithstanding efforts to disarm them, usually been prepared, and ever willing to fight, if hard pressed; and when from the standpoint of their rights as Indians they felt aggrieved. They have been willing to take the issue of battle as a nation, and have not, at least in recent years, while avowedly at peace, sent out marauding bands to rob, murder and mutilate, as the hostile tribes of the southwest have done and as they are doing still.

The campaign in question justifies this much at least in their favor. Although practically in a starving condition, which will be shown later, they made preparations to defend themselves upon the first appearance of troops, and were ready to give battle, especially after the affair at Wounded Knee, if the issue came to that, which then seemed imminent; and against all the troops which could be brought against them. They have risen

to a dignity of warfare above mere murderers of innocent settlers. It has been said by the highest authority, and most truthfully, that "too much credit cannot be given to the troops who endured the hardships, and sustained the honor, character and integrity of the service, risking their lives in their effort to restore peace and tranquility, placing themselves between a most threatening body of savages and the important settlements of the frontier in such a way as to avoid the loss of a single life of any of the settlers." While not wishing to dissent from the opinion here expressed, nor to detract in the slightest degree from the credit due to our troops, whose valor and devotion to duty in times of danger have never been impugned, yet it is a fact beyond dispute in the minds of all those acquainted with the conditions surrounding this, as well as our other recent campaigns against hostile Indians, that the troops are powerless to prevent the murder of civilians near the borders of reservations, when the Indians undertake that kind of warfare.

When the troops began to move upon the Agencies in the early winter of 1890, there had been no outbreak on the part of the Indians. A widespread restlessness and discontent were known to exist, however, and to such a degree that the authorities both in military and Indian affairs deemed it unsafe to await developments on the part of the Indians. They chose to forestall them in hostilities, and by a proper show of force, compel them to a more submissive attitude. What might have happened in the event of delay till spring, it is of course impossible to tell, and it is not the purpose of this paper to question the wisdom of the action taken. It is proposed, however, to examine briefly the situation, and the events leading up to the beginning of hostilities, and to show as far as practicable the causes for this troubled condition, and upon what grounds the movement was inaugurated. To go back to 1876, and following the discovery of gold in the Black Hills,—then a part of the Indian reserve, but which was nevertheless immediately over-run by whites in violation of treaty,—Congress, in the Act of August 15, that year, provided that no more appropriations should be made for the Sioux, until, among other things, "they should relinquish all claim to so much of their reserve as lay west of the 103d degree of longitude (thus giving up the Black Hills country); should grant right of way across their reserve for at least three roads; and should enter into arrangements looking to their

self-support." Negotiations in the following year were made with them covering the points named in the appropriation act, and the Government agreed upon its part, in addition to providing certain schools of instruction, to furnish the Indians a ration for each individual, "of a pound and a half of beef (or in lieu thereof one-half pound of bacon), one-half pound of flour, and one-half pound of corn; and for every one hundred rations four pounds of coffee, eight pounds of sugar, and three pounds of beans, or in lieu of said articles the equivalent thereof, in the discretion of the Commissioner of Indian Affairs; such rations or so much thereof as may be necessary to be continued until the Indians shall become able to support themselves."

These negotiations yielded to the Government the most desirable portion of the Indian reserve at that time, and secured to the Indian, according to his belief, support for an indefinite time to come. The Government, however, immediately began to reduce this ration under the supposition that the Indian would immediately begin to advance toward self-support. It should be noted in this connection that prior to this date, and for a time afterward, game was to be found in great abundance throughout the Sioux country; and the chase, which formerly supplied the Indian's only means of support, continued to supplement the Government ration, and to furnish occupation for the warriors. Within a few years all the buffalo and other large game disappeared and the Indian found himself on a barren soil, with a Government ration and nothing to do. Quoting from a report of a few years ago, "It is hard to overestimate the magnitude of the calamity, as they viewed it, which happened to these people by the sudden disappearance of the buffalo, and the large diminution in the numbers of deer and other wild animals. It was as if a blight should fall upon all our grain fields, orchards and gardens, and a plague upon our sheep and cattle. The loss was so overwhelming and the change of life which it necessitated so great that the wonder is that they endured it as well as they did. Not only did the vast herds of buffalo and exhaustless supply of deer and other animals furnish them with food, clothing, shelter and articles of commerce, but the pursuit of these animals and the preparation of their products, furnished to the great body of them continuous employment and exciting diversion. Suddenly, without warning, all this was changed, and they were expected at once and without previous training to adopt the pur-

suits of agriculture, in a land unfitted for such use. The freedom of the chase was to be exchanged for the idleness of the camp. The boundless range was to be abandoned for the circumscribed reservation, and abundance to be supplanted by limited and decreasing Government rations and supplies. Under such circumstances, it is human nature to be discontented and restless, even turbulent and violent."

The progress of these changes brings us down to the eve of the trouble under consideration, and along with it in the nature of things as stated above, a growing discontent and unhappiness among the Indians, which culminated in positive distress, hunger, sickness and suffering. The Government either overlooked or ignored the fact that the disappearance of game should argue for an increase of supplies, temporarily at least, instead of a continual decrease. The situation may be summed up about as follows: There were three conditions operating against the Indian, and one in his favor,—three chances for him to lose and one to win. Against him he had the steady diminution of game, the unvarying policy of the Government to gradually reduce his supplies, and the almost constant practice of the Indian agent, in furtherance of this policy, to report him each succeeding year progressing toward self-support; and in his favor the one precarious chance of earning support on an unproductive soil, in a difficult climate, which chance was further complicated by his own inexperience, lack of proper training and naturally idle habits. The agent being a civilian, and often without experience with Indians, and owing his position to political influence, may perhaps be excused for his part in this combination. It has been in a manner forced upon him, as doubtless he feels often that his position and reputation depend upon his making some showing of progress in the direction marked out by the Government. Many agents are without doubt excellent men, and the only one I have had any considerable acquaintanceship with—Mr. Wright, of Rosebud, has impressed me as a man of unusual capacity and good judgment in dealing with Indians, and to him I am indebted for much of my information in regard to these people. Their reports, however, in my opinion, do not always express their sincere convictions, or contain the recommendations they might make if entirely unhampered. For this reason perhaps more than any other, the policy of assigning army officers in charge of Indian agencies is a good one so far as the Indians are concerned. The

officer, if properly selected, possesses, in addition to his unquestioned honesty and absence of personal interest, usually a better knowledge of the Indian character from longer acquaintance with him, is better able to judge what progress he has made and what his needs are, and is not dependent upon the Indian Department, and is consequently free and unbiased in his reports and recommendations. In illustration of this, as well as of the condition of affairs about this time, I will quote some passages from the report of an officer in charge of one of the agencies a few years ago. After giving certain data, he goes on to state "The foregoing data are taken from reports made to me by the several farmers from the district and are, I suppose, very nearly correct. The amount of grain and vegetables raised is not given for the reason that Indian farming in a country like this, and especially among these wild Sioux, is only in theory and not in practice. The season is too dry for the soil to produce, and the Indian too tired to cultivate the land if it was suitable and there was plenty of rainfall. The material salvation of these Indians will be found in stock-raising—if they are to retain permanently their present reservation. \* \* \* The appointment of employés at the agency on account of political influence or bias tends to cripple the service, and put it out of the power of the agent to get the best service possible. \* \* \* Only capacity and ability should be regarded as fit qualifications for employment. \* \* \* Until a number of years of peace and quiet, of just and upright administration of affairs, and the fulfilment of the promises of the Government to these Indians has been practiced, it will be folly to consider the Indians permanently settled and entirely peacefully disposed."

The year 1889 marked another change for the Sioux, and prepared the way for the climax 12 months later. In the first place the appropriations for the subsistence, etc., of the Sioux was reduced for this year, 1889-90, to the lowest point reached since the agreement of 1877, being \$100,000 less than the amount estimated for, and appropriated for the two preceding years. This caused a reduction in the beef ration of about 2,000,000 pounds at Pine Ridge Agency, and of 1,000,000 at Rosebud. During this year, a commission consisting of Gen. Crook, and Messrs. Warren and Foster visited the different tribes with a view to negotiating with them for a further cession of part of their lands wanted for settlement by the whites. The remainder was to be divided up between the six reservations, making them separate and distinct,

according to a per capita allowance, the intention of the Government being to allot the land in severalty as soon as practicable.

The commission, after prolonged conferences and much difficulty, finally obtained in the autumn of 1889 the consent of the majority of the Indians, although the cession was bitterly opposed to the end by a considerable element of conservative and non-progressive men, including many of the old chiefs, who saw in this a death-blow to their authority and influence. To obtain the required majority, the commission assured the Indians that their rations should not be reduced, and furthermore, that they should receive in the following spring a certain number of mares, cows, bulls, etc., for breeding purposes; agricultural implements, seeds, and cash payments needed to assist them in agricultural pursuits; and further, on behalf of the Government, promised legislation for dividing the permanent fund derived from the ceded lands, between the different reservations, and assigning to the several bands their respective portions of the said fund, and for making the interest on the permanent fund available at once; also for a specific appropriation of \$187,000, to reimburse the Indians residing on the Crow Creek reservation, in consideration of their receiving less land per capita than the other Indians; also an appropriation to be immediately available of a sum sufficient to make the beef ration of the Sioux Indians equal during the fiscal year ending 1890, to that of the previous year; and appropriations to pay what was acknowledged to be due from the Government for ponies taken in 1876 and 1877 from the Indians at the Cheyenne River, Red Cloud and Standing Rock Agencies. There were other provisions and recommendations included in the treaty, but the above are the most important. During the progress of these negotiations, summer of 1889, large numbers of the Indians were away from the small crops they had started, during the most important season of the year, and as a result nothing to speak of was produced, and the commission had scarcely completed its labors before a reduction in the Government supply was made in accordance with the diminished appropriation before referred to. Congress failed at its next session to make the necessary appropriations for the carrying out of the provisions of the treaty, although urgently advised to do so by the commission, which reported as follows: "In every instance the Indians were assured that subsistence was furnished in accordance with former treaties. \* \* \* Furthermore, it will be impossible to convince



the Indians that the reduction is not due to the fact that the Government, having obtained their land, has less concern in looking after their material interests than before. It will be looked upon as a breach of faith, and especially as a violation of the express statements of the Commissioners. Already this action is being used by the Indians opposed to the bill, notably at Pine Ridge, as an argument in support of the wisdom of their opposition."

Notwithstanding these representations of the commission, and the recommendation of the Indian Department, Congress not only failed to take the necessary action to restore the deficiency in the ration, and to provide for redeeming the other pledges of the commission, but again appropriated for subsistence, etc., for the ensuing year 1890-91, \$50,000 less than the amount estimated for, and \$50,000 less than the sum appropriated for the years 1888 and '89. The division commander under date of Dec. 19, 1890, telegraphed "The forcing process of attempting to make large bodies of Indians self-sustaining when the Government was cutting down their rations, and their crops almost a failure, is one cause of the trouble."

In my opinion, it was the chief, if not the entire cause. My station at this time was Fort Niobrara, in northern Nebraska, somewhat less than 40 miles from the Rosebud Agency. The Indians of this agency, about 5000 in number, are principally Brulés, former followers of old chief Spotted Tail. Among them were found some of the most disaffected and turbulent, and they furnished the largest contingent to the hostile camp, under the leadership of Crow Dog, Two Strike, White Horse and Lance. Also Short Bull, and his assistant Mash the Kettle, medicine men and promoters of Ghost Dance and Messiah craze. The destitute and unhappy condition of the Indians at this agency was most apparent. Captain Earnest of my regiment, reporting upon the situation, about the time of the outbreak declared that upon an average they did not receive more than eight ounces of beef per capita. The crops of the year 1890, owing to the long continued drouth throughout that region, had again proven almost a total failure. The white settlers in the neighborhood of the reservation were scarcely better off than the Indians, and many of them abandoned the country altogether. Most of those who remained were too poor to get away. It should be noted that along with the reduction of the ration of the Indians came also a certain reduction in annuity goods and general supplies,

and incidental to this, a falling off of the moneys the Indians had been accustomed to receive for freighting these supplies from the town of Valentine, Neb., to the Agency. Many Indians visited our post during this summer and fall begging for food. In addition to what they could get from the post commissary, authorized by Regulations to be issued to visiting Indians, they pleaded for the refuse from the slaughter pen and from the company kitchens. Reports came from the town of Valentine of their begging for similar things there. "Two Strike" made pitiful appeals to the post commander, saying that his people were starving and his women and children were sick, and they could not possibly live through the approaching winter without help from the "Great Father."

The condition at Pine Ridge, Standing Rock, and Cheyenne River Agencies, was much the same, and it is largely to this condition of utter want, really brought about by no fault of the Indians, that we may charge the vast sum of money, the hardship, and the loss of life incident to the Sioux campaign of 1890-91. The opinion commonly prevailed at the time, and to a considerable degree since, that there was a concerted plan on the part of all these Indians to go shortly upon the war path, being influenced to that end by the so-called "Messiah Craze," the principal tenet of which was a promised "return of the old order of things, with the buffalo, elk, and all other game; the complete restoration of their ancient habits, customs, and power; and the annihilation of the white man." There was without doubt a widespread delusion of this character, and it helped to precipitate matters, but it was rather a consequence than an original cause. Very few of the better disposed and so-called progressive Indians were caught by it, but it served to unite the various factions of the turbulent and evilly-disposed upon a common thought and object, and in the excitement of the Ghost Dance their other grievances were for the time being forgotten. If it is true that an idle brain is the Devil's workshop then he never found a better one than in the idle brains of these starving Indians, and the guise he assumed, that of a Messiah, is not altogether new in the history of his operations. This craze had its beginnings among the Piute Indians on the Walker River Reservation, in Nevada. These Indians are industrious, thrifty, and well behaved, and the first teachings of the new doctrine did not include any antagonism toward the whites, or promise suc-

cess against them. From the various reports made upon its origin, progress and influence, I have been able to gather the following: The so-called Messiah was a Piute, with an English name of Jack Wilson. He was reputed to be an honest, hard working Indian,—there had been other prophets in his family before him. One day while at work in the mountains, he claimed to have heard a great noise, and on going in the direction whence it came, suddenly fell down dead; and that God came and took him up to Heaven. There he saw a magnificent country, level and green all the time, and all kinds of game. He saw plenty of Indians and white people, all young. They were gambling, dancing, hunting, and having a good time generally. He claimed that God visited him many times after this and gave him instructions what to do. His people were to meet every three months and dance for five nights in succession. He was to send out to the other Indians and have them come to hear him preach, and he was assured that he would convince them that he was telling the truth. He preached to the Indians that they must work all the time and not lie down in idleness; that they must not steal from each other; that they were all brothers and must live in peace, and that they must not fight the whites nor among themselves. He told the representatives of other tribes who came to him to tell their people to keep the peace, and if they began fighting he would help the soldiers to make them stop. He admitted upon being questioned, that he had had a dream that if the Indians got into trouble with the whites they must not be afraid; and that he was to protect them from being hurt; but said it was a joke about the calico shirt being a protection against bullets. He also claimed to have power to bring rain, and claimed credit for the heavy rainfall of the winter of 1889-90.

He had been preaching about three years when the Sioux troubles culminated, but his teachings were pacific, and continued so even after the trouble began, and the only danger apprehended was from the excitement incident to the dances. He was looked upon as an ordinary well dispositioned Indian misled by the delusion that he was a prophet from God. After his alleged success in bringing rain upon the country which came after a prolonged drouth, his fame spread rapidly and representatives from many other tribes, and among them the Sioux, visited the Walker River Reserve to hear the doctrine of the New Messiah

and to take part in the Ghost dances. Some of these representatives on returning to their own people set themselves up as prophets also, or as assistants to the Messiah, organized the Ghost dance, and modified or perverted the teachings they had heard to suit their own ideas, and to gather as many adherents as possible. The few leaders among the Sioux who were really hostile saw in it a means to unite all the idle and discontented elements among their people, as well as the better disposed who were most destitute, and unhappy, on account of the injustice they believed had been done them. It has been stated on good authority that not more than three or four per cent. of these Indians were actually hostile, but that the great majority of those alleged to be so, were drawn into the Ghost dance at first by idle curiosity, and forced into its support afterwards through excitement, and fear of their chiefs and medicine men. I do not hesitate to express my firm conviction that if these few hostile leaders and worthless medicine men had been taken up and sent beyond the limits of the reservation during the spring and summer of 1890, as was frequently urged by agents and others acquainted with the situation, and the Government had complied even with that portion of its agreement to make up the deficiency in the ration so that the Indians might have been relieved from absolute want, the necessity for the movements of troops upon the reservations would not have arisen.

Mr McLaughlan, agent at Standing Rock, protested most earnestly against military interference and stated that he did not need assistance in controlling his Indians or in making arrests. Sitting Bull belonged to this agency. He (the agent) also predicted that the appearance of troops would result in resistance and probably precipitate a fight.

One of the most conspicuous and active of the promoters of the Messiah agitation was a Brulé Indian of the Rosebud reservation named Short Bull. He was absent for nearly a year visiting the Walker River Indians and on his return in the spring of 1890 began preaching to the Indians. He was stopped from doing this by the agent, but commenced again in the fall starting at the same time the Ghost dance. This dance was so called on account of the dress worn by the Indians, which consisted simply of an ordinary skirt for the women, sometimes with fringe at the bottom, and for the men a shirt and sometimes leggins, all of plain cotton cloth, and usually painted with red or blue stripes

and sometimes with the figures of birds and animals. The dance was simply a tramping round in a circle, to a dull sort of chant, accompanied by wild gestures and contortions, and was kept up until the dancers fell exhausted and unconscious, when they were supposed to see visions. A large number would sometimes be unconscious on the ground at once, and as soon as they recovered they would begin again. The Indians at this agency were ordered a second time to stop dancing, the effect being demoralizing, and as a coercive measure, they were informed that rations would be withheld from them till they did so, and returned to their homes. This had the desired effect upon the majority concerned.

About this time, a false report reached the agency that troops were on the reserve. In his report the agent says of this: "The Indians were congregated to draw rations, but in an incredible short time, none could be found, all having gone to meet the incoming force. Going to the scene of the gathering, I found a large number of Indians congregated, clothed only in war paint and ammunition, on horses, armed with rifles and awaiting development."

Shortly after this the agent was called to Washington to make answer to certain charges against his administration, made by an inspector, and the reservation was placed in the hands of a special and inexperienced agent; an illustration of a practice of the Indian Department, which seems to treat most of its subordinates with suspicion, and is willing to take an important official away from his proper post of duty at a most perilous time, upon insignificant and trifling charges of irregularity. Mr. Wright has assured me confidently that he could have controlled his Indians without assistance, had he been allowed to do so. The case was somewhat different at Pine Ridge. The agent there was a new man, having been in charge only a few weeks, and this fact together with the incident mentioned above brought matters to a crisis. The Indians taking advantage of the change of authority at Rosebud, renewed their dances, defied the orders of the new agent and helped themselves to rations from the agency herd of beef cattle.

Short Bull, preaching the theory of a general uprising of the Indians, proposed now to shorten the time originally set for this to take place, on account of the interference by the whites. In his speech he boldly announced that all this race should die except five thousand men. He promised to put holy shirts upon

the Indians, and directed them to continue the dance, and said that the soldiers would many of them fall down dead when attempting to surround them, and that others in trying to escape would sink into the earth. He told them they should not be afraid of anything, and that the Father in Heaven would see that the guns did them no harm.

Agent Royer at Pine Ridge seems to have been helpless, if not terrorized from the beginning. Under date of October 30th, he states "I have carefully studied this matter for six weeks \* \* \* and the only remedy is the use of the military."

A little later he made a more direct appeal, and finally on November 15th, telegraphed: "Indians are dancing in the snow, and are wild and crazy. Why delay further investigation? We need protection and we need it now. The leaders should be arrested and confined at some military post until the matter is quieted and this should be done at once."

Such was the condition of affairs at these two agencies when the Commissioner of Indian Affairs "respectfully recommended that the matter be submitted to the Honorable Secretary of War with request that such instructions as might be necessary be given to the proper military authorities, etc., to the end that any outbreak on the part of the Indians might be averted, and the Indians shown that the authority of the department and its agents must be respected and obeyed." Action upon this recommendation was prompt and decisive. Whatever justification existed in the original causes leading to such necessity, it was not for the military authorities to question at this time. General Miles was placed in charge of the operations and no expense was spared to hasten the movement of troops, and to provide supplies, ammunition and general equipment for a winter campaign. To the Indians, it must have appeared, instead of an uprising on their part, a veritable outbreak of troops, and their astonishment must have been great to see the former practices thus reversed, and themselves anticipated in the demonstration of armed hostility. Not only were the troops in the vicinity of the reservations put in the field, but others were drawn from all parts of the West, the 1st Infantry from California, and the 6th Cavalry from New Mexico. The Medical Department was levied upon from one coast to the other and from Minnesota to Texas. Instead of a detailed account of the operations, which has been given already, and is a matter of history, I will, for lack of space, give



here only the briefest possible summary of the leading events, and then pass to one or two special movements and features of the campaign which seem worthy of attention.

The movement of troops began about the 18th or 19th of November, General Brooke with headquarters at Pine Ridge, taking command in the field at first, and Gen. Miles establishing his headquarters at Rapid City, near where it was thought most likely that contact with the Indians might take place. The troops were so disposed as to surround the hostile bands as far as possible and prevent their junction with each other. The largest part of them had taken to the Bad Lands upon the first appearance of the troops. Sitting Bull, from Standing Rock, Hump and Big Foot of the Cheyenne River reservation, and Two Strike, Crow Dog, and Short Bull from Rosebud were the principal leaders. The situation early in December was about as follows: The main body of the hostiles, composed of Ogalalas from Pine Ridge and Brulés from Rosebud were encamped in a most inaccessible place in the Bad Lands. Remaining Ogalalas were encamped at P. R. Agency, and the other Brulés were at their homes on the Rosebud Reserve. The other disaffected bands were trying to make a junction with the camp in the Bad Lands. The troops were disposed as stated, with strong detachments at the two Agencies.

Hump was first won over by Capt. Ewers, 5th Infantry, and induced to enlist as a scout, and to lend his influence toward breaking up the disaffected bands. Sitting Bull was killed in the attempt to arrest him by the Indian Police on the morning of December 15th; eight of his followers were also killed and four of the Indian Police. Several others on both sides were wounded, some of them mortally. Most of Sitting Bull's followers, along with the Cherry Creek Indians, Hump's own people were induced to surrender soon afterward, through the fearless endeavors and excellent diplomacy of Lieut. Hale, 20th Infantry. They were brought into Fort Bennett, December 24th.

During this time, negotiations were being carried on between the Indians camped at Pine Ridge and the hostile camp on that reservation, and the latter began moving toward the Agency. At about this juncture, occurred the unfortunate affair at Wounded Knee.

Big Foot and his band were destroyed as a consequence of the attempt made by the troops, principally the 7th Cavalry, to



disarm them at Wounded Knee Creek, on the morning of December 29th. I can understand the sudden rage of the soldiers at the action of the Indians on this occasion, and I am not inclined to withhold some justification to the 7th Cavalry, who still carried the memory of Custer and the Little Big Horn, especially as they had orders to destroy the Indians in case they resisted, yet the destruction of Indian life was carried to a most distressing length. This incident which has given a name to the entire campaign, appeals to me as one of the most dramatic as well as one of the most unfortunate in all the history of our dealings with Indians. This band had practically surrendered to Col. Sumner, and agreed to go into the Agency, but afterward escaped him and attempted to join the hostile camp in the Bad Lands. Beyond this they had shown no marked hostility. They were headed off and brought to terms by the 7th Cavalry, and orders were sent to disarm them. The men being separated from the women and children, and surrounded on three sides by lines of armed soldiers, were commanded to give up their arms. They made a pretense of doing so, but only a few guns being produced, a search was ordered. The instant this began the Indians whipped out guns, clubs, and other weapons from under their blankets, and firing upon the soldiers made a rush to escape. With an amazing disregard of consequences, unusual among Indians, they flung a death challenge at more than four times their own number. The Indians say the fight was precipitated by a foolish young Indian firing off his gun; other eye witnesses say that a medicine man threw some dust in the air as a signal for the rush. Very few of the band escaped. They were shot down as they ran, and long after all resistance had ceased the Hotchkiss mountain gun continued to send shots through a ravine where a few miserable wretches had sought refuge.

American Horse, a friendly Indian, speaking of the fight, says: "Of course it would be all right if only the men were killed; we would be almost grateful for it. But the fact of the killing of the women and more especially the killing of the young boys who go to make up the future strength of the Indian people is the saddest part of the whole affair, and we feel it sorely."

Four days after the fight the bodies were gathered up from the snow and buried.

Captain Wallace, 7th Cavalry, and 25 enlisted men were killed, and Lieuts. Garlington and Gresham, 7th Cavalry; Kinzie, 2d In-

fantry, and Hawthorne, 2d Artillery, and 32 enlisted men were wounded. The Indians claim that some of the soldiers were killed by their own fire, which seems not unlikely from the way in which they were placed. 185 Indians were reported killed and a few were taken wounded into Pine Ridge. Following this, the Indians camped at the Agency became alarmed and a large number of them left and joined the camp of the hostiles, and for a time the situation became most critical. Capt. Jackson's Troop of the 7th was attacked returning with prisoners from Wounded Knee by Indians from Two Strike's camp. The Agency was also threatened with attack, and a number of shots were fired, and two soldiers were wounded. What is known as the fight at the Mission occurred on December 30th. In this Lieut. Mann of the 7th was mortally wounded, and one man killed. Several others were wounded. On the same night, some Indians attacked a wagon train of the 9th Cavalry, killing one soldier and on January 3d attacked Capt. Kerr's Troop of the 6th, but were driven off without loss to us.

Lieut. E. W. Casey, of the 22d Infantry, was shot on January 5th, while reconnoitring the hostile camp, by a Brulé named Plenty Horses. This Indian was afterward tried for murder and acquitted. No further fighting took place and the excitement among the Indians gradually subsided, and on January 16th, they came into the Agency and surrendered, 4000 strong. The different bands were returned to their proper reservations, and soon after (Jan. 18th) orders were published announcing the close of hostilities, and returning the troops to their proper stations, or assigning them to new ones.

It should be noted here that before the surrender the full amount of the ration claimed by the Indians was furnished, and a promise given for its continuance, and on January 20th, Congress appropriated the necessary money for carrying out the different agreements made by the Sioux commission of 1889.

I am informed by the Agent at Rosebud that the Indians still boast of having dictated their own terms of surrender, and by their actions of having compelled the Government to return their full treaty ration.

This much is certain, these Indians were not then, and have never been, disarmed in fact. Wounded Knee is an illustration of what an attempt in that direction may lead to. The Indian's resistance to being disarmed is natural. The instincts and train-

ing of his savage life make it his first thought to be well armed. The bow and arrow and his gun have been to him for all time not only weapons for war and for protection, but the means of procuring his food, and of furnishing him occupation and pleasure. They have been his most cherished possessions, and to deprive him of them seems to him the direst calamity which could befall him.

There were called into the field for this campaign, the following regiments or some portion thereof; Infantry: 1st, 2d, 7th, 8th, 12th, 16th, 17th, 20th, 21st, 22d and 25th; Cavalry: the 1st, 2d, 5th, 6th, 7th, 8th, and 9th; two batteries of field artillery, and a considerable number of friendly Indian Scouts; altogether, about one-third of the available strength of the army. In addition to this, the Militia of the State of Nebraska took the field and established guards about all the principal towns and settlements along the Elk Horn Valley Railroad, and near the edge of the Reservation from Valentine to Rushville. The promptness with which they obeyed the call of their governor, and the good spirit shown by them is well worthy of praise. They were totally unprepared, naturally, for such a call, and most of them were entirely without experience in field work. The necessity for their going into the field was not apparent, but possibly their presence along the border may have contributed in a measure to quieting the excitement of the settlers. These latter were badly panic stricken, and some of them, if reports are true, never stopped long enough to look back till they struck the Atlantic Ocean. One family was reported to have moved out by wagon at such speed that a small boy six years old was lost out, and the loss never discovered. The little fellow made his way safely, however, on foot, into the nearest town, eluding all the hostiles on the way; which fact is further quoted as a striking example of western push developed at an early age.

The operations lasted about two months and cost the Government something near a million dollars, besides the lives of several valuable officers and brave soldiers. The Indians have a reported loss of 331. The campaign ended in the Indians' receiving what should have been theirs at the beginning.

These comments constitute a criticism not upon the Army, nor upon the Indian Department, but upon the policy pursued toward these people by the Government, which seems willing to press the Indian to the utmost limit he will stand without fight.

ing. To the service, the campaign had some compensating benefits. It came somewhat as a surprise to the troops as well as to the Indians, and it gave to those actually engaged, especially the younger officers, an experience which will stand them in good stead for the future; and it furnished to all a good object lesson in the movement of troops, and in the supply and equipment of them, and in field work. It showed again what our officers and men are capable of doing, and it developed the gratifying fact that every officer who could do so, went into the field and sought his share of the work. And the work in such a campaign is not measured by the blood spilled at Wounded Knee, nor by the accounts of other actions with the Indians. It is the unwritten history, and the things which go, so to speak, without the saying, which tell the tale.

In this connection, I desire to trace the movements of one company ("A") of my own regiment during these operations. I do this for two reasons, in the first place, because no special mention is made of the company in any of the published reports, although it certainly merited it, and in the second place because it furnishes a good illustration—one of many that could be given—of the truth of what has just been said. This company with two others of the regiment, B and H, and two troops of the 9th Cavalry, A and G, under orders to proceed to the Rosebud Agency, left the post at Fort Niobrara, at 1.45 in the afternoon, November 19th. The command marched about 17 miles to a small stream called Rock Creek, where a halt was made at 8 o'clock in the evening, long enough for the men to get coffee and eat a cold lunch. The march was then continued till 4 o'clock in the morning, when the command reached a hill overlooking the Agency, distant about 38 miles from the post. Here they were halted for four hours without fire or other comfort, and then moved down to the Agency and placed in camp. Most of this march was accomplished after nightfall, and under all the precautions necessary, in anticipation of a possible collision with the Indians. Certain other troops marching to this Agency, two weeks later, and from Valentine, three or four miles nearer, in a single march during daylight, and without the prospect of attack, received most complimentary notice. On December 29th this company with the same two troops of cavalry and a pack train, with Asst. Surgeon J. M. Cabell, and Lt. Ruthers in charge of the mountain gun, left Rosebud at 9.40 in the evening, under orders to proceed in the

direction of Pine Ridge, and assist if possible in the capture of the escaped remnant of Big Foot's band. After a march of 22 miles, they halted for a short rest, and the cavalry continued the march alone to a point 60 miles from the Agency, and there went into camp. That night a blizzard came up and they were compelled to wait for the infantry and train. These came up next day about noon. January 1st, the command marched in the snow 25 miles, and on January 2d, 30 miles,—doubling back towards Wounded Knee. Here they remained long enough to perform the somewhat inglorious duty of burying the dead on that field. From here the company returned about 30 miles, to a point near Pine Ridge and went into camp. At the close of hostilities, the company marched to Crawford, Neb., between 50 and 60 miles, in two days, during one of which it snowed. At this point it took the train, with other portions of the regiment ("H" Co. and Hdqrs.) under command of Lt. Col. A. T. Smith, 8th Infantry, for Merino, Wyo., then the terminus of the B. and M. railroad, and from there the command marched, in the early days of February, to Fort McKinney, a distance of 140 miles. The total distance marched by this particular company was little short of 400 miles, and the average of its regular daily marches about 25 miles. Some of the distance was traversed, as seen, during the night and on forced march, much of it through snow; and the last 140 miles during a period of most intense cold, even for that country and season, the thermometer falling at one time to 40° below zero. The men marched a good deal of the time in buffalo overcoats and overshoes, and the officers wore about all they could carry. Lieut. E. N. Jones was on duty with this company throughout, part of the time alone and in command of it. He had come off sick report to go in the field, and was still weak from the effects of a long illness. Captain Patrick Cusack, who commanded one of the troops of the 9th Cavalry, was practically an invalid from rheumatism when he started out. He was retired shortly after the campaign was over, and has since died.

The Sixth Cavalry had come from the mild climate of New Mexico for this campaign, and were on the march during some of the severest weather of the winter. Their suffering must have been extreme.

The results of the campaign were noticeable for months after it was over in the hospital records and in the deaths of those engaged.

Pursuing the thought suggested here it seems to me a fitting occasion for dwelling a moment, before closing, upon the fact that an officer, while he is expected to acquit himself creditably in the performance of regular routine duty, and to possess himself of a knowledge of the theory of his profession, as well as of the practical details of his particular branch of the service, is not, after all, educated, commissioned, and maintained by the Government for the mere purpose of performing a certain number of hours' daily labor of a prescribed kind, but in reality that he may be always ready for just such occasions as this,—for the real business of his profession,—that of the camp and field, fighting when necessary, sacrificing all else to his country's service in times of danger; willing in spirit at such times to endure hardship and privation; to give up his family, his comfort, and if need be his life. His work may be under a July sun in Arizona, or in the face of a midwinter blizzard in Dakota. Our last two campaigns against Indians have in fact been under just these circumstances. Such campaigns have provided the practical education of our officers and soldiers for the last thirty years, and have contributed much, and more than can ever be told, to make the history of our little army one to be proud of.

This source of practical work will probably fail us in the future.

These Indians are now comparatively quiet, and, with their reservations separated, reduced in extent, and surrounded on all sides by growing settlements of whites, the campaign in question seems to us the closing chapter of the conflict; the final abortive effort on their part to resist the inevitable; their last warlike defiance against the will and authority of the "Great Father."

## LIGHT ARTILLERY HORSES.

BY FIRST LIEUT. W. E. BIRKHIMER, 3D U. S. ARTILLERY.

AS preliminary to an investigation of the subject of proper horses for light artillery service, it will prove interesting briefly to review the equine resources of the United States.

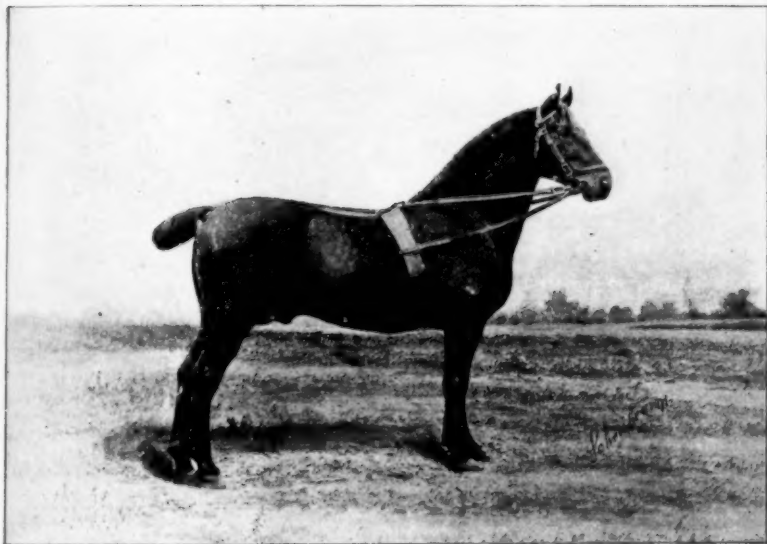
### BREEDS.

There are many breeds in various parts of the country. They include the English thoroughbred, Percheron, Cleveland Bay, Hamiltonian,\* Hambletonian, Morgan, Hackney, Norman, and many others. These cannot be said to be confined exclusively to any locality, although Morgans seem particularly to thrive in Maine, Vermont and New Hampshire. Hambletonians in Massachusetts, New York, Pennsylvania, West Virginia, Kentucky, Tennessee, Montana and California. In Pennsylvania the Percherons and Normans are favorites, while the Hackney, for carriage purposes, is now everywhere forcing himself upon public attention. By judicious crossings with these cultured breeds, in which attention for generations has been devoted to improvement in particular directions, the native American horse has been greatly improved. The English thoroughbred is the race-horse *par excellence*, but in the United States has been developed an animal that rivals him in courage and staying qualities, and greatly excels him in general utility—the American trotter. The thoroughbred is too nervous for general military purposes, and, under hard usage is apt to break down below the knees. By thoroughbred is meant the pure blooded English race-horse.

Numerous establishments for improving breeds of horses exist in the United States. And many associations have been formed for the same purpose. Of the latter may be mentioned the annual horse show in New York, and the Hackney Association in the same city. Of individual enterprises there are the Palo Alto stock farm, Menlo Park, California; the Brook Nook

\* Hamiltonian or Hamlingtonian. This name is often confounded with Hambletonian. They are distinct strains, but it is unfortunate that their names are so similar. The former was got by Diomed, sired by Sir Archy. The latter was sired by imported Messenger.





HACKNEY STALLION YOUNG NOBLEMAN.

stock range, Montana; Ashland Park stock farm, Lexington, Kentucky, while many dealers, as for instance, ex-Mayor Hugh J. Grant, of New York, at his New Jersey farm, are successfully engaged in raising the standard of the horses disseminated throughout the country.

No district of the United States, to the exclusion of others, is preëminently adapted to producing good horses. In one respect Vermont has excelled, and that is in raising large numbers of the Morgan strain, than which, perhaps, there is none more interesting. It has every good quality except large size that can be desired: it is also indigenous to American soil. At this time numerous stallions of this blood are being sent to Europe for breeding purposes. Ethan Allan, whose picture accompanies this, is an excellent representative of the Morgan family, a singular circumstance connected with which is that the blood of the original is unknown; for, notwithstanding it is frequently asserted that the Morgan family sprang from the thoroughbred or the Arabian, Mr. Linsley, who has the most thoroughly investigated this matter with every desire to come to an opposite conclusion, announces that the ancestry of the original Morgan cannot be as



ETHAN ALLEN.

certained, although the identity of the animal is well established.

For the lighter horses, race, carriage and trained saddle-horses, no portion of the country surpasses Tennessee and Kentucky, but they are better adapted to cavalry than artillery. The reverse is the case with those raised in Central New York. In California, at least at the late Mr. Stanford's stock-farm—Menlo Park—race-horses and light carriage horses are principally raised, rivalling in this respect the most famous establishments of the world. In New Mexico and in the State of Washington the product of the native mares of best quality when crossed two or three times with Normans, has been an animal sufficiently large, active and enduring for all business purposes. Montana is especially well adapted to horse raising. The great elevation adds to the lung power. The stony character of the soil makes the hoofs exceedingly tough. And so favorable are these conditions, that in Montana at this time, extensive and successful efforts are being made to raise trotting-bred coach-horses possess-



PERCHERON STALLION THOR.

ing size, style and action. They combine every requisite for the ideal artillery horse.

In fact every section of the United States, except the Southern, and particularly the Gulf States, has demonstrated its ability to raise in numbers suited to any demand, horses admirably adapted to artillery purposes.

Of the imported strains before mentioned the Normans, Cleveland Bays, and Percherons are essentially draught animals; the thoroughbreds, race-horses; Hambletonians, trotters; Hackneys, coach horses. The Morgans do fairly well as trotters, carriage horses, and even for draught purposes. The vast variety of breeds found in the United States results from crossing these prominent types, together with many others more or less so, upon the common horses of the country.

To cross successfully great care is necessary. Blood tells here as elsewhere, but only if properly directed. Experience has shown, apparently, that, in crossing, it is the blood of the sire rather than that of the dam which dominates. Furthermore, the excellence of the progeny will generally depend, where good dams have been selected, upon the degree of pure blood of the sire,



FAYETTE WILKES TROTTER.

rather than of the dam. Nor should too much be expected of the first cross. It is only when this process has been judiciously repeated that good results can reasonably be anticipated. As a matter of fact the actual artillery horse with which we deal belongs to no particular breed, being more or less a mixture of many.

Although when we speak of the thoroughbred the English race-horse is meant, it should be understood that the designation is only one of convenience; no inference is to be drawn therefrom prejudicial to the pure blood of the other imported strains mentioned, all of which, in their best state, can, equally with the former, trace their ancestry back to either North Africa (Barb) or Oriental (Spanish or Arabian) stock.

#### NUMBER OF HORSES.

In 1895 there were in the United States 15,893,318 horses and 2,333,108 mules. In European Russia it is said there are 20,000,000 of the former, and of these 2,971,473 horses are officially reported as suitable for military purposes. Austria has 1,500,000 horses, Hungary, 1,900,000; but unquestionably, on account of the vastly greater care given to raising them, a much



MACEY'S HAMBLETONIAN.

greater proportion of the latter meet military requirements. No official estimate has been made of the number of horses in the United States fit for military purposes. But from their estimated average value, \$36.9, it is readily seen that, when the average price of horses purchased for the military service during the same time was \$167.83, the far greater part of the 15,893,318 horses are below the military standard. One-half of the whole are found in the section bounded by Ohio, on the east; Missouri, on the south; Nebraska, west; Minnesota, north. The three States, Illinois, Missouri and Iowa, furnish over 2,500,000, and these of quality much above the average. No wonder that St. Louis is a good horse market. For artillery purposes mules are only used with us in wagon trains. In 1885 there were exported from the United States 1947 horses; with some fluctuations, this number increased yearly, until, in 1895, it reached 19,988,—or tenfold in ten years; the average price of the exports fell during the same period from \$198 to \$110, or almost 50 per cent. The circumstance but illustrates the effect with us of supplanting

horse-power by electricity and other mechanical appliances. The value of these exportations is varied, depending greatly upon the purpose to which they are to be put. Macey's Hambletonian (see p. 537) for instance, was sold to German purchasers for breeding purposes for \$10,000. His record as a sire in Germany is scarcely excelled. On the other hand, there are on the ranges of Oregon, Washington, Montana and other western States and Territories, European purchasers for alleged military purposes, who pay the owners but \$20 per head, land them in Europe at an expense all told of \$85, and there sell them (as they assert) for \$150 apiece. Between these extremes horses of all shades of values are being exported. But it is a fact of common cognizance that in our great commercial centres foreigners for some time past have been purchasing carriage horses and trotters at a figure with which our home dealers cannot compete. Regarding the value of horses purchased in our eastern cities for European military purposes reports vary. By some they are said not to compare favorably with our own, particularly our artillery horses. Others think they are superior to any that might be purchased at any price on our Western frontier.\* However, these statements may be reconcilable. It is said that foreign breeders look with consternation upon this influx of American horses; and, with reason, should the experiment prove successful.

In examining the other side of the balance-sheet, it appears that there were imported into the United States in 1885, 21,734 horses, increasing in 1888 to 52,033, thence falling to 11,833 in 1895, the total diminution in ten years being about 50 per cent. The average price of the imports fell off during the same period from \$63 to \$54 per head. When we reflect that a very considerable number of these importations are high-class horses for either breeding or pleasure purposes—thoroughbreds, Hackneys, Percherons and others,—it becomes evident that cheap horses are not all going one way. We receive as well as give them—but not directly for the army.

#### GOVERNMENT ASSISTANCE IN HORSE-BREEDING.

In the United States, unlike most European nations, the Government does not engage either in breeding horses or maintaining them for this purpose. No particular breed is used with us for the army. Nor is preference given to horses raised in the

\* JOURNAL M. S. I., No. 80, p. 434.

United States. Paternalism here has not yet gone to that extent. In most European states it is otherwise; and even in Italy, where purchases are made as here in open market or by contract, a preference is given to horses or mules bred in the country.

Until recently, when the experiment was essayed as before mentioned of importing from this country, France supplied her artillery, as well as her other arms and services with exclusively native stock. Her artillery horses are divided into three classes, saddle and light draft (wheel and lead). Officers and sergeants ride saddle-horses only. Those ridden by corporals and privates may also be used as leaders in the teams. The rule there is general that all artillery horses shall be suited for saddle purposes at any moment. The back of the draft horse must, consequently, as well as that of the saddle-horse proper, be of a conformation such as will carry a saddle without friction. They appear to pay more attention to the saddle, while we enhance the importance of draft qualities.

There is, in Russia, no special breed of horses for artillery service. The same is true in England; and in fact this strictly is true in all countries, but in some much greater care is taken in selecting than in others. Closely allied to selection is the attention given to improving breeds for commercial and military purposes. In every European state this matter is under the supreme control, not of the military but of the civil administration; and while military officers are associated with the civil in subordinate rôles in the great work of improving breeds of horses, it would seem that the main object of government in every instance is primarily to advance the interests of the civil community, and that improvement for military purposes is incidental although confessedly important.

#### STALLIONS FOR GENERAL SERVICE; STUD-FARMS, REMOUNT DEPOTS.

In Europe three prominent ways are resorted to for improving or selecting horses, stud-farms, keeping stallions for service throughout the country, and remount farms or dépôts. These all are maintained at government expense.

#### STALLIONS FOR GENERAL SERVICE.

Prussia, since 1787, has gradually been improving her horses by standing all over the country a large number of full-blood or half-blood stallions. These are bred at government stock-farms



of which there are three, containing over 2000 horses. During six months of the year the stallions are distributed through the country in villages and farms. The cost of service is nominal, from one to five dollars. Careful records are kept of all foals.

In France the government, at an annual expense of about \$300,000, maintains 2000 stallions which are, as in Prussia, distributed over the country for the benefit of the community. So in Russia. There the government studs annually offer about 3000 stallions for public service. The offspring of these stallions is of the best, and everywhere land-owners and peasants besiege the authorities with requests for the assignment of the greatest possible number for use in the various localities.

The Hungarian government has a number of depôts to which stallions are sent annually for the season from the stud-farms soon to be mentioned. They are used for breeding to private mares exclusively. They are of all types, from the light riding or draft to the heavy work horse. In 1883 and 1891 the strains of these depot stallions were :

English thoroughbreds...	93	252	Gidran.....	198	253
do. half breeds.....	686	1001	Norfolk trotter.....	113	40
Arab thoroughbreds.....	32	27	Lippizinar.....	165	210
Arab half breeds.....	372	356	Norman.....	38	74
Nonius.....	323	413			
			Totals.....	2020	2626

The increase is largely English thoroughblood ; Arabian horses have decreased ; the Norfolk trotter or hackney, now becoming so great a favorite in this country, has there nearly disappeared, while the heavy Normans are advancing into favor.

In attempting to interest the whole people in the improvement of horses, the Austrian government has had to combat much prejudice. To overcome this it has appealed to the financial interests of its subjects at the sacrifice of its own. This has caused it to purchase yearly in open market both stallions and brood-mares, letting out the services of the former, especially when extraordinarily good mares are to be covered, at very low rates. The studs are thus run at a loss to the government, but to the pecuniary advantage of the people. In thus breeding, the rule is followed of keeping the types of horses together, each distinct from the other types.

Besides this, the government of Austria-Hungary has a system of loaning horses which, so far as known, exists nowhere else. The government purchases annually a certain number of

horses, and, after training, loans them to trustworthy people. In case of mobilization, they are at once turned in upon demand. Officers of the army are permitted to borrow on the same terms; but, to one furnished forage, this does not reduce the number of private horses he must keep. An inspection is made every year of the loaned horses. After 6 years in Austria and 5 in Hungary the horses become the property of the borrower, provided he has kept them in excellent condition. In this manner, the government is enabled to keep a large number of horses in time of peace without the trouble and expense of taking care of them.

## STUDS.

Breeding studs have been tried in France and abandoned. Purchases there are in open market. Artillery horses so purchased are sent direct to their regiments. In both these particulars this is similar to our own and the English practice. The only exception, in France, is in case of leaders for the teams, and the men's horses of the horse batteries which are under five years of age. These last named are retained from date of purchase in depots of transition until they have reached five years when they are distributed to their regiments.

In Russia and in Austria-Hungary, however, governmental breeding-studs are maintained at great expense, and with every care inspired by a just appreciation of the importance of nurturing and improving their breeds of horses. In the former, the stud at Yanoff produces saddle-horses and thoroughbreds; at Chernoff, trotters and pack-horses; at Derkool, thoroughbreds; at Novoe Alexandroff and at Limoreff, half-breed saddle-horses. Besides these, there are numerous imperial stables, where are kept, as before mentioned, government stallions for the public service of mares belonging to the general population. All these studs and stables are under the control of the chief director of the government stud. At the head of each stud and stable is a director with a fixed number of workmen and grooms.

Under the Emperor Nicholas I. (1825-55) Military studs were established in Southern Russia and in the vicinity of Moscow where were bred the finest cavalry horses. Under his successor, the Emperor Alexander II., these studs were partially abolished, and partly transformed into government studs and stables.

But it is to the government studs of Austria-Hungary that we turn for evidence of greatest care in improving the noble animal which whether in peace or war and equally in defeat as in victory,

is our companion and our friend. They are established at Mezöhegyes; at Babolna; at Kisber; and at Fogaras. The former was started in 1785. Stallions were imported from Turkey and other eastern countries. The best native mares were used. The first year there were 194 stallions and 553 mares at Mezöhegyes. An attempt was soon made to combine this stud-farm with an army remount depot, but unsuccessfully; and after the Napoleonic wars the latter feature was abandoned. After this, owing perhaps to the establishment of other stud-farms, the number of stallions decreased at Mezöhegyes to 56 in 1830, 55 in 1860, and 19 in 1890, but for practical purposes the quality has by a judicious system of selection been improved. It is said, however, that only after the establishment of the dual government in 1868, when Hungary assumed control of the stud-farms, were they made really successful. Prior to that the admixture of too many strains, in the attempts to produce the perfect horse, had in fact resulted in many inferior ones. In 1879 the Hackneys were dropped at Mezöhegyes, where there are now about 500 brood mares. The English thoroughbred is in great favor, as also are two strains known respectively as *Gidran* and *Nonius*. The former is the product of a particular strain of Arabians with English thorough-blood; the *Nonius*, a particular strain of Normans with the latter. The *Nonius* are extensively used in the artillery. They inherit mild dispositions from their Norman ancestors, while their thorough-blood imparts courage and great staying qualities.

The stud-farm at Babolna near Budapest was established in 1790 and was auxiliary to that at Mezöhegyes. Its specialty was and is oriental breeds. The crossing of orientals with thorough-blood was here not successful. The stock of this farm now is Arabian, pure or half blood; and to it the ancestry of many army horses may be traced after admixture with the thorough-blood, and many strains vaguely known as oriental.

The Kisber stud-farm, a short distance from Babolna, was started in 1854. The reason for establishing it was said to have been the unsatisfactory results that elsewhere had attended the mixing blood of opposite types. By paying sufficiently to secure originally, first-class material, a high standard has here been attained. For one stallion \$13,000, and for another, \$45,000 was paid. The horses there now are about 12 thoroughbred stallions; 30 thoroughbred and 160 half-bred mares, the latter with a high percentage of thorough-blood.

The Fogaras stud was established in 1874. It is devoted almost wholly to the Lippizaner breed (mixture of Spanish and other oriental bloods). The object of this stud is to build up a breed of small stocky horses for mountain work.

Reference to this breed calls attention to the imperial stud of Lippiza, established in 1580 and therefore the oldest in Europe. Its main object seems to be to turn out horses for the royal family. The stock is a mixture of Arabian and Andalusian, kept pure with great care. There are at present at the stud about 80 brood mares, 5 stallions, and 250 young horses and geldings. About 40 horses are sent from here annually to Vienna for use exclusively in the imperial stables. One peculiarity of these horses is, that, allowed for generations to roam over the Karster mountains unshod, their hoofs are so hard as frequently not to require shoeing; in this respect and for the same reason rivalling our native Montana horses.

Colts are sold from all these studs; but the thoroughbred Kisber only to those who guarantee that they will not be removed from the empire. While in the United States in 1890, the average price paid for thoroughbred yearlings was \$900, the Kisber yearlings, sold at auction, brought on an average \$1500; a fact wholly due to appreciation of their superiority.

From the first establishment of its studs, the Austrian government has sought to interest the people in the improvement of horses. Opinions as to the best course to pursue have changed with the times. At first private owners sought to graft on the native stock the Oriental alone. Afterwards the English thoroughbred, half-bred and Hackneys were preferred, being more imposing looking than their rivals. Thus English blood has come finally into favor in both government and private establishments. Further to encourage private breeders, as well as to infuse fresh blood into the studs, the government buys a number of stallions and mares in open market. In this manner many of the Kisber horses sold as yearlings, are repurchased after having distinguished themselves on the turf.

Before leaving the subject of Austria-Hungary studs it were well to remark the failure there that generally has attended attempts to produce good horses by crossing large with small breeds. Experience has shown that where two horses of positive but dissimilar types are mated, the product in nearly every case is a mal-proportioned animal, inferior in essential qualities. The

two striking exceptions in Austria-Hungary are the *Gidran* and *Nonius*.

#### REMOUNT DEPOTS.

Remount depots are found in all the Continental states, and to a limited extent in England. The idea prompting to them is to procure colts or young horses, and then, before placing them in ranks, subject them to a course of training under skillful supervision. It is diametrically opposed to the principle upon which we proceed, namely, that the newly purchased horse is immediately fit for service. These remount depots, unlike the studs before mentioned, are established for military purposes alone. Military men either mainly or exclusively constitute the purchasing boards, although the skill and experience of civilians may be put in requisition in handling the remounts; but the command of the depot is entrusted to the military commander of the district in which the depot is located. In France there are 17 of these depots; in Algeria there are three. About 1300 horses, four-year-olds, are annually purchased, trained for two years, and then distributed to the army.

The government studs in Russia are insufficient to answer the demands of the army. Young horses are purchased in open market, sent to remount depots for one year, thence to the corps requiring them. No regard is paid to sex. During peace, remount horses (not necessarily to be sent to depots) are procured from private studs, the herds on the *Don* and other places throughout the empire.

In Prussia there are five remount commissions. All artillery horses are purchased by them. The horses come from all the provinces and are of no special breed. There is no difference between light artillery and heavy cavalry horses. There are 14 remount depots from which horses for cuirassiers and uhlans are often assigned to the artillery. The head of each remount depot is a civilian. His assistants are accountants, inspectors, veterinaries, forage masters and grooms. Remounts when purchased must be over three and under five years old. They are kept at the depots about two years. As there are no governmental breeding establishments, the young horses are brought up in the country, and in a very large percentage of cases are the product of government stallions let out to service under the system before mentioned.

The British Empire has two remount depots, one at Woolwich,

the other at Dublin. Since 1887 the purchase of all horses has been made under the Inspector General of Remounts. The purchases are from rising 4 to 7 years of age, and are sent, as is most convenient, either directly to their corps or to the depots. The general rule is to send them for training directly to their corps. The main difference between this plan and our own is, that the English purchase young horses, with a view to preliminary training, while we purchase mature horses only.

In Austria remount depots are of comparatively recent origin. The preferable mode there was to purchase from the owners and send directly to the corps where needed. To obviate, however, the difficulty in procuring 5 year old remounts, a large number of  $3\frac{1}{2}$  year foals are bought and kept at remount depots until  $4\frac{1}{2}$  years old, when they are assigned to regiments. There are three such depots, containing 1400 remounts. The personnel is similar to those in Germany. Losses of horses by the field artillery in war are supplied from the field artillery horse depots. During peace the light artillery is to some extent supplied with remounts from the three remount depots.

Compared with the European nations before mentioned, little attention has been given to horses in Italy. In this respect things are changing for the better. Although here as in Austria purchases for army purposes in open market is the policy, yet remount depots have in late years been established, where 3 year olds are sent, kept  $1\frac{1}{2}$  years, and then drafted to corps. We have nothing regarding artillery horses to learn from Italy. But a small percentage of their horses fit for military purposes reach the acceptable military age of five years, and it is said that their officers are almost always mounted on foreign horses.

#### GOVERNMENTAL MEASURES TO IMPROVE HORSE BREEDING IN THE UNITED STATES.

From what precedes, the importance that long has been attached to the improvement of the horse by European governments is evident. The Government of the United States has done little directly to encourage this branch of industry. The necessity for so doing has not, down to this time, been so apparent with us as abroad. The relative density of population in the two hemispheres may, of itself, be a circumstance which sufficiently accounts for these diverse public policies. There, where people live compactly, the masses can exist only by great economy in their business affairs, and it is a boon, particularly to the peasantry, when



governmental authorities extend a helping hand. Thus far our situation has been the reverse of this. Our population is comparatively sparse. Competition is the soul of every business enterprise. In this struggle, extensive governmental aid has not been found either advisable or necessary. All has been regulated by the rule of demand and supply. To a limited extent, however, the Government has rendered assistance. By act approved July 2, 1862, an amount of public lands equal to 30,000 acres for each Senator and Representative in Congress that the States were entitled to under the census of 1860, was presented to each State for the encouragement of education in agricultural pursuits. To this end, the money derivable from the sale of the lands was, for each State, made a perpetual fund. This was followed by the acts of March 2, 1878; August 30, 1890; June 30, 1895, in furtherance of the same liberal policy. The result has been the establishment of numerous agricultural experiment stations in many of the States and territories of the Union. Here, among other subjects, the study of the horse, the distinctions of breed, the characteristics of each, the capacity and physiology of all, is intelligently pursued under educated and practical veterinarians. The good work done is not confined to the limits of these experiment stations, but through the efforts of their pupils afterwards, and the distribution of valuable literature emanating therefrom on the subject of the horse, correct principles regarding his successful breeding are being widely disseminated among the people, to this extent realizing the beneficent ends of government.

#### STANDARDS FOR LIGHT ARTILLERY HORSES.

Our Army Regulations have recently changed the standard of artillery horses, and in the direction of securing a lighter and more active animal. The height is now from  $15\frac{1}{2}$  to 16 hands, weight from 1050 to 1250 lbs., age from 5 to 8 years; only geldings of uniform and hardy color taken; what constitutes a hardy color is not indicated. These are the requirements at purchase; but it is well known that a five year old of these proportions well-cared for as they are in our light batteries in time of peace, often grows at least an inch taller and takes on from 100 to 150 more pounds. No distinction is made between light artillery draft and saddle-horses. All should be available for both services. The practice with us is to use the smallest horses of the team for leaders, the next larger for swing, the heaviest and largest for wheelers.

For field artillery, the Russians require the horse to be not

less than 14 hands, not under 5 years old, broad chested, compact frame, specially adapted for rapid movements. The saddle-horse for horse batteries must be light and active, of short and straight back, about one-third length of body, short and broad loins, and height not less 14.5 hands, age from 5 to 9 years, of either sex, or any color except light gray and white. In each artillery brigade the horses are assigned to batteries according to colors, of which there are three, black, bay and chestnut.

In Prussia the average height of the artillery horses with the batteries runs from 15.5 hands to 16.25 hands; weights from 1100 to 1300 lbs. A favorite method is to place the tallest horses in the lead, the next as wheelers, the smallest in the swing; purchases are made without regard to color, no particular one of which is regarded as especially hardy or desirable; but the horses are assigned to batteries according to color.

The Royal Artillery of England have horses which, at purchase, are from 15.2 to 15.3 hands high. This at from 3 to 4 years of age. They are expected afterwards to grow an inch, and pick up from 100 to 150 pounds. The field artillery draft horse is generally taken from those having least thoroughblood, being selected because of size, weight, and pulling qualities. Horse artillery draft horses have better blood, and are more active. All wheelers are compact and powerful; they need not be so high as the others of the team, but well made, short-bodied, short-legged, plenty of bone and substance, large strong hocks and pasterns, well shaped, moderately large feet. Riding horses of the Royal Horse Artillery are fair specimens of medium cavalry horses. Field artillery horses, and the draft horses of the horse artillery, occupy a place somewhat midway between the medium cavalry and transport horse, the conformation being suited to the active galloping draft work of the horse artillery and the somewhat slower but still active work of the field artillery. All colors seem to be accepted; but dark browns, dark bays, and dark chestnuts are preferred.

In Austria the minimum standard height for cavalry, artillery, non commissioned officers' horses and train horses, is 15 hands; for draft 15.72 hands: for pack horses 14.73 hands. Maximum height, non-commissioned officer's riding horse, 16.1; horse artillery cannoneers, 15.2; team horses, artillery, 16.4 hands. Only exceptionally good saddle and draft horses are taken at the minimum height. The minimum purchase age is 5 years, but un-

usually good horses may be taken at 4 to 4½ years. The maximum age for remounts is 7 years. Purchases are confined to geldings and mares. No horse is rejected on account of color. In the artillery team, the heaviest are wheelers, next leaders, the smallest in the swing, as is sometimes the case in Prussia.

In France, artillery horses, at purchase, range from 15.1 hands to 15.79, and may even go as high as 16 hands. No standard of weight is established; this is generally true in Europe, where girth measure is preferred to and takes the place of our estimation by weight; and if the horse measures in girth from 8 to 9 inches more than in height, he is called short-legged, a class to which all our own light artillery horses, without exception, would be relegated under the same test. In supplying light draft or wheel horses the ministerial instructions are never lost sight of that all artillery horses must be capable of being used under the saddle at any moment. And for horse artillery, whose special service requires marches at a prolonged gallop over all kinds of ground, the animals must have special qualities for resistance, gait and temper. Dark colors are preferred; and it is only when a sufficient number cannot be obtained that special authority is given to purchase a limited number of white or gray horses; not that the latter are regarded as less hardy, but are too easily distinguished.

In Italy no account in procuring remounts is taken of breed, origin or color, but, other things equal, preference is given to native stock; heights range from 14.62 hands to 16.38; ages, from 4½ to 8 years at purchase.

#### SYSTEM OF PURCHASE AND INSPECTION.

In the United States, under the law, artillery horses as well as other public animals, are procured by contract. Competition is invited, and inspection made by the Quartermaster's Department, all under the direction and authority of the Secretary of War. In the Western States and territories it is understood that cavalry officers are associated with the quartermasters in purchasing for that arm; but at this time, so far as advised, this is not the practice as to the artillery. Except that this policy deprives artillery officers of the opportunity of judging horses we cannot regard this as important. The desideratum is good light artillery horses; and so we get them it is, except for this feature of depriving artillery officers of valuable experience, a matter of small importance who purchases them.

In two important respects this practice differs from that in vogue in Europe, namely, the contract feature, and having the horses inspected by a staff department instead of boards in which combatant officers predominate. The contract system is a favorite one for obtaining public supplies in this country. Even during the Civil War our horses, where practicable, were so procured. This at the time when they were being purchased at the rate of 500 per day. It is based upon the principle that competition brings all wares to their true value; that the procurement of military horses is a purely business matter, and that the interests of Government are amply guarded by the inspection to which all horses are subjected. It is difficult to find fault with this course of reasoning. If the results be not happy, the difficulty must be in the practice, not in the theory. And, after duly weighing every objection we have seen urged against it, they make out simply in some cases a severe arraignment of the competency of the inspectors; if the latter be qualified and but do their duty, all reasonable objections disappear. In Europe, however, purchase by contract is not encouraged. The various remount boards deal, preferably, directly with the owner. This of course eliminates the middle-man and his profits. It also eliminates competition. Indeed, so far from competition being encouraged, the reverse is practiced in some cases. In France, for instance, it is officially reported, that a point is made of maintaining prices at a sufficiently remunerative figure, no matter what may be the fluctuation in the market.

The examinations to which horses are subjected in all countries are directed to a single point, viz.: Securing for government service a sound animal, well adapted to the object in view. The standard for artillery horses is not the same everywhere: again, in countries like Austria, Germany, France, where infusing good horse blood throughout the community is systematically pursued, it is to be expected that there will be nothing like the number rejected on examination as with us. Here the superior quality of their stock becomes apparent.

In regard to price, comparisons are curious rather than useful; because, as before remarked, it is not regulated by a universally pervading principle of demand and supply. Last year the average price of our artillery horses was \$148; in Prussia, \$200; Russia, \$112.50; Austria, \$140. In France the price is considerably higher than with us; but the importation of horses from the

United States into that country now being carried on will have a tendency to lower these prices. We require no guarantee from the seller: it is a fair battle of wits between him and the inspector. In some countries, as in Italy, such guarantee for a certain period is required; and if faults unfitting the horse for service be developed within that time—40 days,—he is returned to the seller.

From the age at purchase of our artillery horses—5 to 8 years—we may estimate the average as about  $6\frac{1}{2}$  years; and, as long experience has shown that the average length of service of artillery horses is 7 years, our horses will average  $13\frac{1}{2}$  years when we part from them. We naturally might expect that, in the service-life of artillery horses, good blood would make itself manifest. Of course it does; but, in comparing the service-lives of artillery horses of the various countries, it is difficult to make this apparent, and for the reason that the horses are not used under the same conditions everywhere. In Russia the artillery horse lasts on the average 10 years; in Prussia 9 years; in England 10 years; in Austria 8 to 10 years; in France 7 to 8 years.

#### MOBILIZATION.

The United States has no scheme of mobilization for horses when war breaks out. Our supply system then is the same as in peace except more extensive. The supply responds to the demand; it ever has, and we may suppose it ever will.

In Prussia the conditions of artillery horse-supply are different in different corps. On the Southern frontier the field artillery is completely horsed in three corps; in the other corps, about half horsed. The heavy or siege artillery, of which each corps will have 8 batteries in war, in all 160 batteries, has only 8 batteries horsed. Taking into account other siege artillery, artillery wagons, parks, ammunition trains, etc., it is estimated that during peace not more than 30 per cent. of the necessary artillery horses for mobilization are kept in service. But all the horses necessary for war have been examined and accepted, and arrangements made with the owners to deliver them immediately on mobilization. Under this system it is believed that the artillery can collect their horses as quickly as the reserve men can be called in.

A national defense Act was passed in 1888 by the British Parliament, authorizing, in an emergency, the compulsory purchase of horses. To avoid the delays to be anticipated in enforcing this act a system of voluntary registration is adopted. A

government official travels over the country and enters into contracts with owners to keep their horses at disposal of government for a stipulated annual compensation. A registration is made of each horse so contracted for, and where he may be found ; in this way it is known just what government can depend upon. For home defense 28,749 horses are needed at mobilization ; 13,599 are kept in service during peace, 15,150 to be supplied. In 1893 about 14,000 horses were registered as above described. It is estimated that about two weeks will be needed to collect them. The Royal Artillery require 4288 horses in peace, and 9668 at mobilization, leaving 5380 to be then supplied. For mobilization purposes, the English hold that green farm horses are useless ; that immature horses are inadmissible for immediate service ; and that none but grain fed animals full of muscle and energy are of value.

Horses, mules, camels, etc., for the auxiliary train and general transport purposes are obtained wherever they best may be.

In Russia the supplying the troops with horses when the army passes to the field status and in times of war, is effected by their acquisition from the general population, the number determined by lists prepared in advance showing what is required on the war footing. The total number so required is about 100,000 horses—only one three hundredths of those suitable for military purposes in European Russia.

For mobilization Austria requires about 250,000 horses. Her peace establishment requires 62,000 ; Landwehr, 16,000 ; leaving about 172,000 to be supplied. The state is divided into districts for furnishing horses, on mobilization, and the number to be supplied by each is fixed annually. Horses are conscripted. Owners are punished for attempting to avoid this process, but any town can avoid the conscription by turning into the proper military commission its contingent of horses taken from that conscription district. The horses of the imperial family, the postal service, the horse-breeding governmental establishments and a few others are not subject to conscription. For conscription purposes horses are classified as non-serviceable, serviceable and un-serviceable ; those for the army are selected from the serviceable class alone.

During peace, the French artillery requires 36,341 horses ; a field battery there has 61 horses, all told, and a horse battery, 87. During war the former requires 156 horses exclusive of officers'



horses, a horse battery, 212. In France, then, as in Germany, the number of horses in the artillery during peace is about 30 per cent. of the number needed for war.

In passing from the peace to war footing, the French military authorities have a right to requisition horses. The course pursued is much the same as that practiced in Russia, Prussia, and perhaps other Continental states. Mixed commissions are appointed in the various army corps regions, the military members selected by the corps commander, the civil by the prefect. All are designated in time of peace.

The contingent of horses to be furnished by each canton is fixed in accordance with the total number of horses on the census lists, and the total number required of each kind. As the number on the lists is generally in excess of the numbers required, the requisite number is drawn by lot from the total number of horses fit for service.

#### REMARKS ON REMOUNT DEPOTS IN THE UNITED STATES.

There has not been nor is there now any remount depot in the United States. Speaking for the artillery, they are not believed to be advisable or necessary. The cavalry, in this matter, will take care of its own interests. But, so far as light artillery officers have been heard from, they appear satisfied with horses allowed under existing regulations. We regard the keeping Government stud-farms, or the loaning out Government stallions in this country after the manner practiced in Europe as impracticable. It is wholly foreign to our ideas; it would seriously interfere with private industry by placing the Government in competition with private dealers. The maintenance of Government remount depots, however, would not be open to this objection. In fact, by the purchase of well-bred colts private horse-breeding establishments might be encouraged to improve the general stock. But, as affects the artillery, we must regard this measure with reference strictly to its practicability. This is no field for the purely ideal. Regarded in the light of utility and practicability, remount depots, for artillery purposes, appear to be unnecessary; and, without going further, for this one reason: we are able without trouble to purchase all the artillery horses, of the standard we set up, from private owners among our own citizens, thus by the patronage of Government encouraging this important industry. The resources of our people in this particular far exceed every demand of Government. Part of the over-

flow, as before mentioned, is now seeking new channels in foreign military services—particularly Germany and France.

Purchase by contract, therefore, as now enjoined by law, is not only the traditional but the favorite policy of Government, varied in war by emergency purchases in open market. This is accepted as established, for the present as well as the future. In the matter of inspection, however, it would seem that change could, with advantage to the service, be made in present practices. It would be the fitting and proper thing if artillery officers were placed on all boards for the purchase of light artillery horses. The captain of a light battery ought to know all about horses for his arm. All concede that. Yet there is no test for this so thorough as the purchasing them from a great number offered, the best only of which are to be accepted. It puts the artillerymen upon their mettle, turns their attention to the practical and theoretical study of the horse, and certainly will, when the field is to be taken, to say nothing of garrison life, return the Government many fold all expenses incurred. In the long run it will prove to be a mistaken system which, when it can be avoided, ignores artillery officers in the selection of their horses. They are held, officially, to a full knowledge of this important subject; yet this policy overlooks that fact, and deprives these officers of one of the most practical means of instruction. "By order" is, of necessity, all-potent in the military service; but the opinion is ventured that its efficacy never yet went to the extent, in instituting an officer as battery commander, by that act alone to make him a good judge of a horse. But, as he is held responsible for the well-being of horses after assignment to the battery, sound policy seems to counsel that he be given every opportunity for improvement both theoretically and practically. A voice in the selection of horses for his arm will plainly be conducive to this end.

#### SIZE OF ARTILLERY HORSES.

The size of our horses is a matter of great importance. It safely can be alleged that the prescriptions of the Regulations are generally under rather than over the fact, as illustrated in the battery, particularly in time of peace. This may be due to the circumstance, well known by experience, that horses as a rule grow considerably after purchase. This is illustrated in light battery C, 3d Artillery, to-day where the leaders will average  $15\frac{1}{2}$  hands, weight, 1075 pounds; the wheelers,  $16\frac{1}{2}$  hands, weight, 1327 pounds; very nearly what, in practice, is found in the Ger-

man batteries, although they arrange their pairs differently. Our swing horses are intermediate between those above mentioned, being about 15.75 hands, and 1230 pounds. From inquiries made it is believed that the average height and weight of the horses at present in light battery C exceeds that in some other batteries in our service; and, at the last inspection, the inspector remarked that the horses of the battery were too tall and too fat. Those whose heights and weights are given above were purchased under the old regulations of the army. The modifications before referred to as having recently been made in specifications regarding artillery horses are as follows: the height now is from 15 $\frac{1}{4}$  to 16 instead of from 15 to 17 hands; weight, 1050 to 1200 instead of 1050 to 1300 pounds. The effect will be to give us greater uniformity in size, lighter and more active horses. The change is believed to be in the right direction: particularly if we expect, as the drill regulations contemplate doing in an emergency in campaign, to trot four or five miles without breaking the gait; or, as it is said the Fort Riley light artillery battalion can do now, make a march of ten or twelve miles at the trot without detriment to the animals.

It is not practicable to have all our horses of the same size; but it is wise to approximate this as nearly as possible. Two practical reasons for this suggest themselves. First, that interchangeability may be possible. With us each of the mounted personnel of the battery is permitted to ride a Government horse. As a result, it will be possible for any horse in the battery, in an emergency, to be ordered interchanged with any other; and, if from nearly uniformity in size, this may be done with advantage, team horses with galled shoulders or other injury may temporarily be relieved, and thus the efficiency of the battery be greatly enhanced. Second, with horses of nearly uniform size in the same team, the line of traction, extending from the point of the shoulder of the leader to the end of the single-tree will be more nearly parallel to the ground than if this uniformity be wanting. With us this is a matter of great importance, owing to the construction of our harness, which conforms strictly to the English, French, Austrian and Italian method of coupling; the Germans using a double-tree at the end of the pole, to the single trees of which both swing and lead pairs are directly and independently attached. This makes the distance between wheel and swing pairs in the German team about twice what it is between the

swing and lead, in this particular conforming to the Austrian practice. But actual measurement shows that, when, with the ordinary team, the traces of our harness are stretched, the line of traction is almost straight, therefore favorable to draft, without a downward component on the shoulders of the wheel and swing horses.

Official reports of our officers show that the Austrian artillery horses, although undersized, externally, when compared with our own, far exceed them in powers of endurance. We say externally, because in texture and weight of bone the advantage is said to be the other way and in favor of the Austrian horse. Our officers who have witnessed their performances are loud in praise of the staying qualities and recuperative powers of the Austrian blooded horse, as found in their artillery generally, and declare that the larger common horse picked up in the country cannot at all compare with them in these important respects. It is said that during the autumn manoeuvres, while the artillery horses are well fed and groomed, they are subjected in every other respect to extraordinary hardships; they get not a mouthful of food or water from morning until night; they are made to travel at rapid pace over the most difficult country; they carry the full campaign equipment, yet the riders never dismount from their backs from the time they leave bivouac in the morning until they return to it at night—10 hours generally; still these horses turn out fresh and animated every morning, and at the end of the manoeuvres are in as good condition as at the beginning. Blood tells here certainly. And herein the Austrian empire reaps the advantages flowing from its extraordinary care bestowed on horse breeding. Our military attaché after attending the manoeuvres on different occasions, states that he has not observed among all the horses seen in Austria-Hungary so many badly proportioned ones as he had seen sometimes at home in a single troop or battery. The improvement they now are laboring to effect is in the size of their artillery horses; this, sought for principally through judicious crossings with the English thoroughbred, is gradually being brought about. Comparing our horses with theirs we may say, that ours are relatively short legged and big bodied. It is a common thing for ours to measure from 10 to 15 inches more in girth than height, yet with them it would be considered extraordinary; and among well-bred horses this disproportion is never found.

Unquestionably we can produce as good horses in this coun-

try as can be raised anywhere. A proper system of crossings persistently adhered to between the Morgan and Thoroughbred would doubtless develop the ideal artillery horse. But while this is possible, it is not from an army standpoint practicable; because, after grown, there would be no military demand for such horses at all commensurate with the expense of raising them. Therefore, it were useless to discuss the scheme. Our hopes lie in another direction. By purchasing, within the limits of appropriations, horses of good qualities for the artillery, which fortunately there now is a disposition to do, private dealers and owners will be encouraged to improve their breeds. The result will be to the mutual advantage of the Government and the people, whose true interests, in this, must be identical; and this marks the limit to which, in this direction, Government will go.

#### HORSES FOR OFFICERS.

It is an interesting question whether or not horses for officers' mounts should be of different sizes from the draft horses of the teams and mounted enlisted personnel. Unquestionably in foreign services officers' horses are distinct from the others, to greater or less extent, coming within the category of saddle-horses strictly instead of team horses. In those services, however, officers almost without exception, own their own horses, which, as a rule, they may purchase under certain limitations, out of the ranks; while with us, as it is authorized, light artillery officers generally ride Government mounts. This difference is perhaps bottomed on the fact that abroad light artillery is a permanent, with us it is only a temporary service. The practical question, therefore, is, would it be wise for Government, in order to accommodate light artillery officers whose mounts it furnishes, to purchase a distinct class of horses, admirably adapted to the saddle, but not to team purposes. We have no hesitation in answering this question in the negative. Certainly the Government is under no obligations to do so; while the practice, if instituted, would strike at the important principle of interchangeability before mentioned as being so desirable in a battery.

#### HORSES FOR HORSE ARTILLERY.

The distinctions in some services between the horses for horse and field artillery have no place with us, except in time of war. In foreign armies the former are lighter than the field artillery horses. In England this difference is emphasized by the more thoroughbred being placed in the horse artillery. But the de-

scription of the leaders in our Regulations governing the purchase of artillery horses, before mentioned, would appear sufficient, if strictly followed, to procure for us, at any time when needed, everything that an extensive horse artillery experience during the Civil War shows us to be necessary in the most arduous cavalry campaigns.

POINTS TO BE OBSERVED IN SELECTING HORSES FOR LIGHT ARTILLERY.

The following \* are the qualifications to be sought, and the faults to be avoided, in the selection of artillery horses :

Leader, dark bay ;  $15\frac{1}{2}$  hands ; weight not under 1050 nor over 1100 pounds ; age 5 to 7 years ; head and ears small ; forehead broad ; eyes large and prominent, vision perfect ; chest full, broad and deep ; fore legs straight and standing well under ; shoulders not too heavy, but sufficiently broad to support collar ; barrel large, and increasing from girth toward flank ; withers elevated, but not sharp or long, or to interfere with keeping saddle in place or being injured by it ; back moderately long, with broad, deep loins, short coupled, and solid hind quarters ; hocks well bent but not excessively so, resembling what is known as sickle legs, which unfits an animal for heavy draft purposes ; pasterns slanting back, but not too long ; feet neither too large nor too small, well opened at heel.

A flat foot, one with a large surface exposed to the ground, is objectionable. Long legged, loose-jointed, long-bodied and narrow-chested horses should be rejected as well as those having the following bad points : Head ; a large, common, coarse head, narrow between the eyes, Roman nose, contracted nostrils, white face, glass eyes and white of eyes prominent, small pig eyes, moon eyes, spot on pupil of eye, lampas, or any inflammation of the ridges of roof of mouth. Neck and withers : Thick, coarse neck, loss of mane ; very heavy, thick withers ; withers very high and sharp, or extremely long, thereby rendering the back liable to be injured by the saddle, rendering it difficult to retain the latter in place. Body : Atrophy of the muscles ; hernia ; wens, warts and humors of any kind ; coat harsh, dry and staring ; sides sloping in towards the loins, that will cause saddle to slip back ; small, light barrel, called herring gutted, the converse of large barrel, indicating fretfulness and want of endurance ; an unsightly, distended, bulky stomach ; roach back, sway back, a very long back, and lengthy between the last rib and haunch bone ; upright shoulders ; coarse and prominent hips ; a very crooked tail, or one unsightly in appearance ; scars, enlargements and abrasions, particularly about withers and back. Legs and feet : Wind galls, side bones, curby hocks, ring bones, splints on or close to the muscles of the leg, very straight pasterns, very long and crooked pasterns, dropping behind or knuckling, calf legged, cow hocked, shaky condition of front legs,

\*Furnished by Colonel James M. Moore, Assistant Quartermaster General, U. S. A.



sand cracks, false quarter, very large feet or those that turn out or in, cracked heels, contracted feet, feet that interfere or overreach, thrush, pumice soles, corns, ridges on shell of feet indicating previous fourder, stiff hocks, broken knees, speedy cut, crooked hind legs, paddle foot, short stepper, a stumbler, a poor walker, want of action in walk or trot and a dull logy animal that requires urging to walk; bone, blood and bog spavin and thorough pin; the slightest inclination to lift one hind leg higher than the other, indicating string halt. Vice and unsoundness: Difficult to mount, rearing, bucking, running away or bolting, biting, kicking, a confirmed rumbler, a roarer, affection of windpipe, or whistling or wheezing noise after a sharp gallop, cribbing, wind sucking, weaving, the habit of moving from side to side in the stall.

The wheel horse should weigh 1200 pounds, be 16 hands high, and in other respects conform to the description given of the lead.

The horse should be well bred, according to our standard, broken to ride, of a kind and gentle disposition, with free and prompt action at the walk, trot and gallop; without a blemish or defect of any kind. Only geldings should be taken in any case.

#### DATA GERMANE TO THE GENERAL SUBJECT.

The following data, compiled at the office of the Quartermaster General, United States Army, will be found interesting in connection with this paper.

#### STATEMENT OF NUMBER OF CAVALRY AND ARTILLERY AND DRAFT HORSES AND MULES ON HAND, SOLD, DIED, LOST, ETC., DURING PAST 10 YEARS, WITH COST OF ANIMALS; ALSO SHOWING AVERAGE YEARS OF SERVICE.

FISCAL YEAR.	No. of cav. horses purchased.	No of art. horses purchased.	No. of C. & A. horses sold, died, etc.	No. of C. & A. horses on hand at end of fiscal year.	Av. price paid for cav. horse.	Av. price paid for art. horse.
1885-86. ....	1,193	58	1,007	8,609	\$139.93	\$167.70
1886-87. ....	1,331	74	1,269	8,745	133.42	156.86
1887-88. ....	889	35	1,133	8,536	136.40	167.91
1888-89. ..	923	35	1,200	8,294	130.25	167.07
1889-90. ....	913	73	836	8,444	129.07	166.21
1890-91. ....	1,136	132	1,434	8,278	129.38	175.91
1891-92. ....	725	75	975	8,103	125.75	159.90
1892-93. ....	892	83	908	8,170	119.02	160.86
1893-94. ....	957	79	754	8,452	99.19	122.66
1894-95. ....	619	63	1,422	7,712	95.44	148.04
	9,578	707	10,938			



FIS. YEAR.	No. of draft horses purchased.	No. of mules purchased.	No. of draft horses sold, died, etc.	No. of mules sold, died, etc.	No. of draft horses on hand at end of fiscal year.	No. of mules on hand at end of fiscal year.	Average price paid for draft horses	Average price paid for mules.
1885-86..	18	563	36	629	454	5,493	\$205.85	\$154.99
1886-87..	61	625	80	726	435	5,392	211.16	151.64
1887-88..	30	5	69	896	396	4,501	201.73	180.00
1888-89..	32	369	55	584	373	4,286	180.89	143.45
1889-90..	28	273	40	352	361	4,207	197.39	150.79
1890-91..	44	1,082	49	794	356	4,495	195.25	160.83
1891-92..	27	71	47	717	336	3,849	198.52	163.47
1892-93..	33	552	28	386	341	4,015	183.42	164.34
1893-94..	36	281	32	236	345	4,060	179.94	122.14
1894-95..	34	102	84	1,088	295	3,074	167.83	114.64
	343	3,923	520	6,408				

The average efficient life of a horse in the artillery or cavalry service is shown by experience to be about seven years.

The total number of horses and mules in our service is 919 less than the number of horses used by the Royal Artillery in time of peace.\* We have seen that in Prussia, the number of artillery horses in peace is about 30 per cent. of those required for war.† Our total of horses and mules may run up from the present number—3369—to 300,000 as reported by the Quartermaster General November 3, 1864, when the Civil War was flagrant and at its height. Experience shows that, for all purposes, we require with our armies about 1 serviceable horse to 2 serviceable men.

#### EXPLANATORY REMARKS REGARDING ACCOMPANYING PICTURES.

The accompanying pictures of horses portray the peculiarities of various and selected breeds.

The first in order is the imported English hackney stallion, "Young Nobleman." He won the gold medal at Islington, London, England, and now is owned by Mitchell Harrison, Esq., Philadelphia, Penn.

Ethan Allen, foaled June, 1849, who comes second illustrates to advantage the Morgan family. Of this strain, as of the Arabian it truly may be said that all that is necessary to produce an excellent artillery horse is an infusion into it of thorough-

\* *Ante*, p. 551.

† *Ante*, p. 550.

blood or some of the other pure blood of larger sizes. He was a bay, stood 15 hands high, weight 1000 pounds.

Thor, the thoroughbred Percheron, next in order, owned by George V. Cresson, Esq., Philadelphia, is 16.1 hands high, weighs 1400 pounds, closely built, large eyes, and gentle disposition. It is generally acknowledged that, for draft purposes, this breed, either pure or well crossed, cannot be excelled, and they are represented as possessing great spirit and activity. The Austria-Hungarian government have extensively used the Percheron, and continue to do so, to improve their breeds in the essentials, size and weight.

The next two, Fayette Wilkes and Macey's Hambletonian, are faithful representatives of these famous strains. They were at one time owned by B. J. Tracy, Esq., Ashland Park stock farm, Lexington, Kentucky. The former stands 15 $\frac{3}{4}$  hands high and is a splendid type of the American trotter, the excellent qualities of which have been heretofore remarked upon. It is in the United States what the thoroughbred is in England—the embodiment of those high qualities in the horse which the genius, the occupations and tastes of our people most demand. Fayette Wilkes was sired by the celebrated George Wilkes.

Macey's Hambletonian, a bay stallion of that strain, is 15 $\frac{3}{4}$  hands high.\* He was bred by Robert Bonner of New York City. Such a sire, with the best of the mares of the country, would here, as has been the case with him in Germany, produce a stock having every requisite for artillery purposes.

These horses represent different strains which together with many excellent others, have served by judicious crossings to elevate the character of the American horse, until, at this time, as heretofore appears, the demand for horses bred in the United States is by no means confined to our own country. For army purposes this makes us independent; and, without entailing on Government the expense of maintaining stallions for public service, stud farms or remount depots, places within our reach, and at reasonable prices, horses in every respect suited to army use. The supply is abundant, beyond every demand except perhaps during a war of the greatest magnitude. The only task imposed on Government is by an adequate system of inspection to select the best.

---

\* *Amle*, p. 537.

## MILITARY AERONAUTICS.

BY CAPTAIN W. A. GLASSFORD, SIGNAL CORPS, U. S. A.

WERE an anatomist to study the relation which the functions of the Signal Corps bear to the intelligence which directs the body of the army in active service he could not better define them than in the terms of his own science as functions of peripheral nerve extremities. In his own studies of the complex body of man he has found that at the ends of the most highly organized nerves of the system are certain specialized cells which play a most important part in the corporeal economy. These cells do nothing in themselves to advance the work under progress, yet without the exercise of their special functions nothing could be done. They are the physical organs of the brain functions known as the senses; even are they called with greater dignity the wits themselves. Without them we cannot conceive of intellect; in proportion as they are defective so fails the man.

It is no specious analogy, this comparison of the duties of the signal officer to the highly specialized functions of the organs of sense-perception. The acumen, the keen skill which drives masses of men to victory over other masses of equally brave men, all rest in the brain of the commanding general who is himself the brain of the army. Upon his senses of sight, of touch, of hearing, must he depend for the determination of his plans of campaign. Yet of his own sensory organs the limit is soon reached. His own sight has the limits of range and visual angle which the law of nature imposes; limits which he may not transcend. He can hear no further than air will carry sound distinctly. Here he rests upon the specialized duties of the signal officer to act as better and wider-reaching senses. It is as though he were able to project his eye and the delicate auditory meatus miles away from his brain and receive therefrom as true reports as of things close at hand. It is because the signal officer bears this relation to the intelligence of the army that the very latest military weapon, the balloon, comes within the functions of his corps.

The war balloon is to be viewed in two regards. One may be

dismissed in this inquiry ; it is not yet accomplished ; it is for the present an artillery dream, and if ever to be made real it will fall into the province of ordnance in general. This is the use of the dirigible balloon or flying machine as a vehicle for the transport of bodies of high explosives ; in short, making it into a superterrestrial torpedo.

The other, that which will form the topic of this paper, is that use of the balloon which is no longer a dream but a reality—its use in widening the prospect of the general officer and discovering for his intelligence many of the plans of the enemy which would be hidden from his unaided sight. This is the purpose of the war balloon. Revert yet once more to the metaphor drawn from the science of anatomy. The balloon is the eye, the trained observers in its car stand for the sensitive retina, the optic nerve is replaced by the wire in the cable of captivity communicating with the field telegraph and thence direct to the brain at headquarters. This balloon even transcends its prototype, for if the nerve of communication is severed it makes no difference so long as the strongest glass can pick out the waving of the flags with which the observer is trained to communicate intelligence.

It is the tactics of this new engine of the art of war which we must study. We must examine into the best means by which it can be used when battle is joined and how it can be adapted to the conditions of the army on the march. It is to be studied in all its relations to the needs and emergencies of the campaign and from this study must come a definite system of balloon tactics which shall direct the production of the maximum results from the force occupied with the aerostat.

Since the balloon is as yet an unfamiliar body to the army at large it may be well to preface the development of its tactics for purposes of reconnaissance and correcting the fire of artillery by a summary of its construction.

The balloon adopted for the United States army follows the English in the material used for the envelope and its system of inflation with hydrogen stored under pressure within steel cylinders ; and it reproduces the essential features of the French in the plan of its suspension gear. In the English balloon, the basket is attached to the concentrating ring of the netting close under the neck of the balloon, which has the advantage of diminishing the weight and giving ready access to the balloon from the car. The French think, and experience justifies their judgment

that the trapeze suspension placed between the neck of the balloon and the basket materially checks the tendency to rotate—a great desideratum for those making observations therefrom.

The shape of the captive balloon is spherical with a capacity of 13,000 to 14,000 cubic feet; in these respects corresponding with the ordinary balloon used abroad for captive ascensions, having a lifting power sufficient to carry two men with necessary equipments.

What must be regarded as the type of the army balloon is the envelope formed of goldbeaters' skin, a material well-adapted to the purposes of aeronautics because it is quite impervious to hydrogen gas and is very light. The membranes from which the fabric commonly known as goldbeaters' skin is formed are obtained from the entrails of the bullock, each animal furnishing one. They are, when stretched, from 18 to 24 inches long and 10 to 16 inches wide. These membranes when taken from the slaughtered ox are scraped free from fat and soft parts and salted till needed for use. Upon taking them from the salt they are first culled, then washed and soaked in fresh water until the salt is taken out; a day or so before using they are placed in a vessel containing soft water in which is dissolved some fish glue to aid their adhering qualities when the fabric of the envelope is made.

To make the goldbeaters' skin envelope, a cotton balloon, to serve as a model, is made, of the same size as the balloon to be constructed. Then this cotton balloon is inflated with air from a blower, and when filled the neck is tied to retain the air. The model is kept in a state of inflation by applying the blower from time to time as the air under pressure within escapes. The model thus fully inflated is suspended by ropes attached to the neck and to the top or opposite pole. This suspension permits the balloon model to be turned as upon an axis and thus to bring every part of its surface in rotation within easy reach of the operator. A scaffold frame-work having a height nearly equal to the semi-diameter of the model is placed around one side or semi-circumference, thus presenting to the workmen nearly a vertical surface on which to lay the membranes. This placing of the membranes forming the fabric of the envelope is a delicate operation and is usually performed by women. Each membrane is taken from the water, stretched out upon the surface of the model, smoothed down by hand, and the sides or ends, where irregular, are cut off by a pair of blunt-pointed shears. Being wet and sat-

urated with the solution of fish glue the membranes stretch taut over the surface and adhere while damp to the model. The membranes are in this way placed side by side, the edges overlapping, until the entire surface of the balloon model is covered with one coherent layer of the goldbeaters' skin. Over this first layer a second and then a third are put in like manner, except that the membranes in each alternate layer are placed at right angles to the longitudinal direction of the preceding series. Over the third layer are placed, from the top to the neck, long ribbons about an inch wide of the same material laid in lattice or crisscross. These ribbons are made by stretching a layer of goldbeaters' skin upon a long and smooth oiled board and superimposing thereon five layers successively, and, after drying, the fabric, which resembles parchment, is cut into narrow strips. The intervals or spaces between the interlacing ribbons appear as diamond shaped figures increasing in size from each pole to the equator. These ribbons strengthen the balloon fabric and limit any rent or tear, which may occur should the balloon come in contact with a sharp-pointed object, to about 16 inches at the equator. Over these strengthening ribbons three additional layers of the goldbeaters' skin are placed similarly to the first three. Around the top and about the neck below, an additional layer is placed to further strengthen those parts where the strain is greatest.

After the fabric is thus completed the neck of the model is opened, permitting an outlet for the air in the cotton model, which causes the latter to collapse. The cotton model thus separates itself from the outside fabric, and air is blown into the constructed goldbeaters' skin balloon envelope between it and the collapsing cotton model. The latter is then, when empty, easily drawn out through the neck of the balloon proper. There remains a translucent globe which, except for the latticed ribbons in diamond-shaped figures, appears homogeneous throughout, not a line of joint or lap of the thousands of pieces of which it is formed showing.

In the top of the balloon envelope is now cut a circular opening about 18 inches in diameter, into which the valve-ring or thimble is inserted and seized, and into the thimble the valve is secured. The envelope of the balloon being complete it is placed within the netting, the top of which is secured about the valve-ring, and upon ropes being attached to the ring the balloon and netting are hoisted, air is again blown into the balloon, and the netting is adjusted. After this the balloon is hoisted higher, and

the suspension gear with the basket is attached; after which comes the captive gear—that is, the cable which holds the balloon when it ascends.

The valve is placed at the upper pole of the balloon and consists of a thimble formed by two wooden rings or hoops between which the edges of the circular hole of the envelope are tightly clamped between annular rubber bands so as to be gas-tight. Within this thimble at the under portion and inside the balloon is placed a piston valve pressed tightly in place by springs held by a tripod in the top against an annular rubber washer. Attached to its inside centre is a rope, that passes through the balloon and out at the neck and down to the car, by which the valve may be opened.

The netting, which enfolds the envelope and from which is suspended all necessary parts, is made of Italian hemp or sea-island cotton which is so light that 100 feet will weigh only about a pound and will stand a strain of 500 pounds without breaking. The construction of a balloon net is properly the work of the rope-maker; however, one has been made at Fort Logan, Colorado, by sergeants of the Signal Corps.

The long suspension gear of the Signal Corps balloon, the exact counterpart of which is not elsewhere found, is toggled to the bottom of the net and consists of three trapeze bars, the lowest being a long spreader and beneath which is suspended the basket. To prevent interference of the basket with the captive cable a nearly horizontal bamboo outrigger or small boom is employed. One end is fastened at the middle of the spreader and is held at right angles to it by guy ropes from each end. Around the outer end of this outrigger is spliced a short rope with a toggle on opposite ends. To the upper toggle is fastened rope gear connecting through the ends of the trapeze bars with the netting, and to the lower is toggled a dynamometer to which is attached the captive cable. This outrigger is a valuable adjunct to the trapeze system of suspension which preserves the basket in an unvarying horizontal position. Another advantage in suspending the basket considerably below the neck of the balloon is that it facilitates the use of photographic apparatus which is impossible when any gas can penetrate the plates and fog the silver. For perfect photographic work the separation of the basket from the balloon as far as possible is absolutely essential.

The basket or car is made of wicker work, it is provided with



two small seats, and is 3 feet long,  $2\frac{1}{2}$  feet wide and 3 feet deep. In the English balloon with the basket close under the ring concentrating the netting, the basket is smaller, as one of the aeronauts usually sits on this ring, the thick netting about which forms a comfortable hammock.

A wire cable that serves for the purpose of communication and of holding the balloon captive, is made of twelve steel wires and in the centre of this cable there is a six-strand insulated wire for telephonic work, the outside wires acting as a return wire. Its circumference is  $\frac{7}{8}$  inch, breaking strain one ton, and fifteen feet weighs one pound. As the balloon ascends it is continually raising a greater weight of cable while at the same time it is losing buoyancy owing to the diminution of the atmospheric pressure; so that the captive cable must be as light as practicable, but it must also be strong as it has to hold the balloon besides bearing the weight of the cable hanging below in addition to having to withstand sudden jerks by the wind. On the other hand excessive strength would be dangerous, for if anything has to go the captive cable should be the thing to break first. While a free run, especially with the wind blowing towards the enemy, is not to be desired, yet it is better than for the cable to hold against all strain, for in a great stress if the cable did not give way the net itself would tear and so the balloon escape, allowing the aeronauts and instruments to fall to the ground. This, however, is an extremely improbable contingency.

Experience has proven that shot striking a balloon does not make a great rent, and it takes several to materially cripple it. To insure against this or other accidents, a ring or hoop of wood or aluminum should be placed around the equator of the balloon fastened to the envelope and netting. By this means, in case of a shot piercing the envelope above this hoop the gas would at once escape, but with the rapid descent the lower hemisphere of the envelope would invert itself and so form a parachute; if the shot pierced below the hoop the upper hemisphere would retain some gas and also serve as a parachute.

The balloon when in use is inflated with hydrogen gas made in the usual manner, passed into a retort or gasometer and thence forced into steel cylinders resembling the ordinary carbonic-acid-gas vessels so generally used. The hydrogen is forced into these cylinders at a pressure of at least 101 atmospheres,—that is to say, a cylinder whose interior volume is 1 cubic foot will, when

filled with gas at that pressure, contain a volume of gas which, when released and under ordinary atmospheric tension, will be 100 times as great, 100 cubic feet. By the use of these cylinders the volume of gas necessary for the inflation of the balloon is reduced to one one-hundredth, a volume easily carried by ordinary means of transportation. In time of war the degree of compression may be considerably increased, so that 120 to 160 cubic feet of free gas would be forced into each cylinder, thus requiring a proportionally less number of cylinders; or the same number of wagons would carry more gas and so provide against contingencies and carry a reserve supply to replace the gas lost by gradual oozing through the substance of the envelope. This compression of the gas will be done at a central place where a complete plant is established, and from which the storage tubes are sent filled for use and to which they are returned for filling when empty.

These drawn-steel storage cylinders are 8 feet long,  $5\frac{3}{8}$  inches in diameter and about  $\frac{1}{8}$  inch thick. Such a tube weighs 70 pounds and has a capacity of 1 cubic foot. They are carried on 4 wagons, each wagon carrying 35 tubes. Besides these wagons another specially constructed wagon carries the balloon, its captive cable wound around a drum, and also the other accessories necessary in the operation of a balloon in the field. A small engine may be carried in the balloon wagon with which the cable can be run off or wound up by machinery.

With the storage cylinders filled with compressed hydrogen gas there are many advantages. While the weight of the cylinders is double that of the material and machinery necessary to generate gas in the field, there is avoided a specially constructed wagon for carrying the sulphuric acid, as well as the presence of this acid, which is difficult to handle and will eat away anything over which it is spilt. The generating machinery is liable to get out of order if moved about and lacks the mobility of the gas storage cylinders. Water is essential in gas generation, but with storage cylinders filled there is no necessity of seeking a water course; so the balloon could be filled from the storage tubes upon any field, even in a desert. A balloon can be filled in a few minutes from these cylinders, while if the gas were made on the spot four hours would be required, pending which the opportunity of gaining valuable information might be lost or an impending change of weather arise leaving a half-inflated balloon. Com-

pression of hydrogen gas in cylinders purifies it also, and a greater lifting power is so obtained. It can be generated and stored a long time ahead of possible needs as well as permit the use of less expensive chemicals or the still cheaper generation by the electrolysis of water. The daily loss of gas is readily met by emptying a cylinder of gas which can be carried to the balloon, thus avoiding the towing of the balloon back to the generating place. Lastly, the plan of filling the balloon at some place where water is abundant and then having to tow the balloon to the part of the field where it might be most needed is not feasible when the distance is great, and it would also prevent the balloon being used in an expedition with troops separated for some time from the base of operations; besides, the sight of the balloon compelled to return to a certain place would reveal to the enemy the base and so lose the tactical advantage of which the balloon is capable in deceiving him.

A Balloon Section would comprise:—

1 signal officer in command of both the Field Telegraph train and the Balloon Section.

1 subaltern officer, mounted.

1 aeronaut.

1 1st-class signal sergeant.

2 signal sergeants.

12 or more enlisted men.

The transport for the Section consists of 6 wagons:—

1 balloon wagon; 4 cylinder wagons; 1 escort wagon.

The balloon wagon may be specially designed, but should, like the cylinder wagons, be the "escort" wagon modified for these purposes by placing therein the necessary fittings required for balloon work. This utilization of a wagon commonly in use in the army has the great advantage of avoiding special equipment—a great desideratum in war.

The balloon wagon has at its tail a drum on which is wound 2500 feet of wire rope; that is, the captive cable. The drum is fitted with a strong ribbon brake and has crank handles at each side for winding the rope. Telephone connections are carried from the drum to a box in which are the movable field telephones. The cable runs from the drum through a universal pulley which permits it to follow any movement of the balloon while in the air. This pulley or sheave is connected to a screw shaft which causes it to travel from one end of the drum to the other

and so insures the rope or cable being equally and evenly distributed when wound up on the drum. There are two boxes, in the middle and front of the wagon, which carry ropes and all the necessary small stores; these boxes, when closed, serving as seats for the men carried on the balloon wagon. The balloon packed in its car or basket fits in the wagon between these boxes.

Each cylinder wagon will carry 35 cylinders arranged longitudinally in five rows, with the valve or nozzle end to the rear; and each cylinder is capable of connection with a copper-lined wooden concentrating box into which, when the valves are opened, the gas passes and is thence conducted into the balloon by large flexible connections which are put on when required. The cylinders are kept steady and in place on the wagons by a light iron frame which is unfastened when the cylinders are to be unloaded. The gas from each cylinder is turned on and the contents from three wagons can be run into the balloon simultaneously and requiring only a few minutes. These cylinders are, however, in no way dependent on the cylinder wagon, as the balloon can be filled from the cylinders arranged on the ground; so they may be carried on ordinary wagons or slung on the sides of pack animals.

The valves at the nozzles of the cylinders are most important. They are so fixed that without a valve-key they cannot by any means be opened, and they permit the regulation of the outflow of the gas with the greatest nicety.

The supply wagon is of the usual "escort" wagon pattern, and carries all the reserve stores, the most important of which is a spare balloon and a spare coil of cable.

A balloon train comprises one or more sections or the entire aeronautical outfit of balloons with an army, and would accompany and be attached to the field telegraph train. It may here be noted that the United States army is the first to make the important advance of coördinating the captive balloon and the field telegraph. The general plan for establishing and maintaining communication between the parts of armies contemplates having a field telegraph equipment attached to each division of the army. These divisions starting from headquarters at a base having permanent telegraphic connections with the general telegraph system of the country and with the capital would, with their advance, erect a field telegraph line keeping them in connection with headquarters. As the headquarters followed in the

rear of the several divisions a semi-permanent line would be built fixing the continuity of the telegraph with the capital and the country. When in the face of the enemy, and at other urgent times, communication between division, brigade and regimental commands will be rapidly established by the *flying* field telegraph or telephone lines and by signalling devices.

The wind is perhaps the greatest obstacle to successful captive-ballooning; but it is precisely captive-ballooning which is most useful for military reconnoissance purposes. Not only does the wind tend to put great strain upon the materials but the balloon requires greater buoyancy to rise against the wind; hence a shape which presents the least resistance to it is most advantageous. The spherical form for captive-ballooning is unquestionably the best, for in it the unavoidable gradual loss of gas does not materially affect the shape. A cigar-shaped balloon having a rudder capable of holding the head to the wind would seem to be the best; but in this the difficulty arises of keeping the shape of the balloon except when it is full of gas, a condition in which it is not always possible to maintain it.

Captive balloons should be as small as commensurate with the weight necessary to be carried so as to permit ascensions in as high winds as possible. Hydrogen being the lightest of all the gases, it allows the use of a balloon of proportionately small cubical capacity; consequently the surface exposed to the wind is reduced to the minimum. This gas, however, having great diffusibility, requires, to retain it, very light material as well as very close in texture. Goldbeaters' skin seems to meet these requirements best, as it permits an escape of only about one to two per cent. in 24 hours; that is, the contents of one or two cylinders in the case of an ordinary balloon; consequently its use results in an economy of gas and of material besides exposing the least balloon surface to the wind. Hydrogen lifts from 60 to 68 lbs. to the thousand feet, and as the weight to be lifted determines the size, great care is necessary to select such material for the component parts of the balloon as meet the requisite of extreme lightness, the factor of safety being duly considered. On this question as to the best material for the envelope of the balloon there is some diversity of opinion. The Germans use a certain fabric coated with India rubber; the French use silk coated with a special varnish; the English use goldbeaters' skin.

In all operations by which an army is to gain access to the

theatre of operations the field telegraph must connect the balloon with the headquarters of the commanding general. It is a part of his personal equipment, as much as his own eye, and should move forward always in the closest touch with him. From the description already given of what constitutes the balloon train it will be seen that it can be moved anywhere that headquarters baggage trains can go, and because of its great value it can be pushed into country where baggage might be left behind.

The field telegraph begins its operations from the time it leaves its base, but the balloon is not brought into requisition till close to or in the presence of the enemy. The men attached to the balloon train, except a section at the immediate front, may be utilized with the field telegraph, of which they are a part.

With the opening of operations, the balloon sections take their place in advance of the field telegraph which radiates from headquarters to the front and toward the wings of the army. As the screen of the enemy's cavalry is approached the balloon commences to be useful in overlooking that screen. If, now the conditions permit the constant use of the balloon, the utility of reconnoissance by small detachments or in force for purposes of information and to feel the enemy is of small avail, and much energy is reserved for the time when the opposing forces, manœuvring in plain view from a balloon, press upon each other so closely as to bring on a general engagement.

A balloon section, with the equipment already noted, can have a staff officer a thousand or two feet in air within less than an hour from the time the ascension is ordered. An open space is found where the wagons can be parked side by side in front of a smooth level place for the spreading of a canvas upon which to lay out and inflate the balloon. The gas in the storage tubes is conducted into the balloon through a flexible pipe. First the gas in the tubes of three wagons is completely emptied, these wagons are then started for the base with the emptied tubes to be refilled and to bring back filled ones. The cylinders from the fourth wagon complete the inflation and replenish from time to time the loss of gas.

The balloon once inflated must so remain for the time being, but it need be elevated only when observation of the enemy is desired. It can be moved from place to place, from one wing to the other, for observation or decoy when the configuration of the country will permit the latter.



A captive balloon, when 2500 feet above ground, is reasonably safe from the fire of modern artillery at a distance of a trifle over three miles, especially if the balloon position is frequently changed. With a forward movement the balloon may therefore be placed between the advance guard and the main body, generally just in front of the latter, but always as far forward as practicable for the purpose of extending to the utmost limit the range of sight. As the advance guard encounters the enemy, artillery is posted generally from one to three miles from the enemy. While this artillery fire is being conducted the main body is massed behind it upon ground chosen by the commander. This assembly of troops upon a front, greatly extended by reason of our modern armament, requires time. These movements call the balloon into particular use to ascertain the position of the enemy's forces, his movements and numbers. With the first skirmish of the advance guard, if the commander desires to bring on a battle, the field telegraph line should be pushed forward with rapidity toward the balloon and a place be selected outside the reach of artillery and connection therewith be made as quickly as possible. If a flank movement or retreat be contemplated, the balloon in front of the main column should maintain itself there as long as practicable to veil from the enemy for some time at least the commander's real design; for a balloon hovering over a particular spot for some time will concentrate attention on that locality.

It is, however, when an engagement may be imminent, and in the sphere of tactics, that the balloon service will find its greatest opportunity in closing lines of intercommunication upon a widely extended line of battle. The quick and unencumbered movements of troops made possible by modern equipment, the destructive fire which such bodies may deliver in the smallest fraction of time, demand, to meet them, counter movements of the utmost rapidity. It is claimed that the aerial observer, connected by field telephone and telegraph with all portions of the army and its headquarters, to note all such movements of the enemy and instantly transmit the information for the use of the commanding general, is one of the best means of meeting the changed condition of modern war.

Another pertinent consideration in this connection, as one result of the lengthened and constantly lengthening range of modern guns and the adoption of magazine rifles, is that the intervals

between opposing lines of battle must be far greater than heretofore, and the unsupported movement of a body of troops, exposed as it would be to the rapid and destructive fire of modern infantry or artillery, would result in the almost instant annihilation of such troops. With the development of small-arms and machine guns the intervening distance between the fighting fronts of armies has increased from the few paces over which David's sling projected the stone against the forehead of his enemy, through the much longer range of the noisy musket, to the still greater range of the smokeless and comparatively noiseless modern gun—a range quite beyond the limit of accurate aim. The fighting lines are thus moved back from plain view of each other to such a distance that, to see clearly across it, eyesight must be supplemented by the field-glass or telescope; this greater interval of distance usually including greater diversity of topography to further embarrass operations.

In addition to the foregoing considerations it should also be remembered that the revolution in the art of war by the introduction of the open order system of firing, with all its concomitants of crawling skirmishers in inconspicuous uniforms, or men entrenched within rifle pits, etc., greatly increases and accentuates the necessity for numerous elevated eyries from which the telescope can reveal and the telephone transmit to the commander information as to operations on a distant line—operations which would otherwise be hidden even from such eminences as that of Santon at Austerlitz, of Solferino Hill, or of the Little Round Top at Gettysburg.

All great commanders have recognized that a full view of the enemy's movements within effective cannon-range is the first pre requisite of a good position; and it is evident that in the extended and somewhat distant lines of battle unavoidable in the future such a position can be secured only by the aid of artificial means. This means can in no way be so effectively provided as by the captive balloon properly connected by the appliances of modern invention, so that the commander on an extensive field can, by being himself elevated in the balloon, or through the eyes of his staff officer so raised, conduct the tactical movements of a battle.

It also appears that much valuable use is possible from the captive balloon by utilizing it to determine ranges. From such a considerable vertical height a signal officer in the balloon can

with proper but simple appliances calculate with great accuracy the range from a battery to a distant mass or line of the enemy. In fact one of the most promising and important of the several applications of the captive balloon is its employment for watching and correcting the range of artillery fire. Those who have tested this function of the balloon are satisfied with the results up to four miles. Artillery fire at extreme ranges, and where the object aimed at cannot be seen from the battery or from any position near it, is well known to be an easy means of wasting an immense amount of valuable ammunition to very little purpose. But in the attack and defense of fortresses and entrenched camps, and in all cases where high-power ordnance carrying large projectiles are employed, the use of a captive balloon to watch and correct the angle of fire will enable such guns to be used to the greatest advantage at ranges and under conditions where, without balloons, it would be a useless expenditure to attempt it. Batteries of powerful long-range guns, when aided by balloons to properly train their pieces, will render encampments, anchorage, and all movements of troops in an open country in any considerable bodies, very dangerous and insecure anywhere within 5 miles of the position they are defending; and against conspicuous distant objects upon which batteries might direct their fire, still greater distances could be covered up to the maximum distance within range of the gun. Thus with powerful ordnance of the latest type the zone of country which could, by the assistance of captive balloons, be covered, would be the practical radius about any defended position.

From the fact that a distant action will not be disclosed as heretofore by either the smoke or noise of engaged cannon, the changed condition of the future battle-field will render obsolete the accepted military axiom that detached troops having no special orders should march in the direction of the sound of cannon. The artillery that will not be heard or seen from a distance, though hotly engaged, must therefore be watched, and reported from an aerial position through the glass in the hands of a military aeronaut.

In the defense of rivers and bridges, the captive balloon will facilitate the early discovery of the assailant's preparations. The aerial lookout can transmit information of what he sees of assemblies of troops (perhaps in a thick forest) debouching through the frequently narrow approaches to a ford or crossing, and thus give

warning in time to provide for a speedy concentration of troops to dispute the point of passage.

I have said that the sight of a distant balloon creates the presumption in the mind of the enemy that it hovers over, or is not far distant from, a main body of troops; and in consequence toward that point the greatest vigilance would be directed. If several captive balloons be elevated from different points above a wide field of operations the mind of an opposing commander may be kept in a state of uncertainty as to the exact position of the principal mass of the forces operating against him; and this uncertainty may still further be increased by elevating decoy balloons on the flank of an army. It is therefore to be noted that the balloon may be utilized in the domain of strategy—a feature of the usefulness of the military captive balloon which has not yet become fully recognized; and every one of these decoy balloons will have equal value as points of observation and report.

General E. P. Alexander, on General Lee's staff as chief of Ordnance, had a captive balloon during the "Seven Days'" fight before Richmond, and signalled from it what he saw, by suspending one or more balls at different distance intervals below the balloon. He improvised a simple code of signals which were furnished all commanders, and which, seen below the balloon, communicated the movements of the Federal forces. General Alexander states that "a balloon will be worth a great deal more to any army than it costs. Its existence will be a constant thorn in the flesh of the enemy and will add many a weary mile and many a discomfort to their camps and marches. The best trained and most acute staff officers should be selected for balloon observation, and brigade, division and corps commanders should have opportunity to make ascensions with them."

Not only for purposes of reconnoissance but for other important uses, a commander of an army in the field should have several balloons. This necessity arises from the fact that in modern warfare an army both in its strategical and tactical movements will have to operate over a more extended theatre of war than formerly, and the field of view can therefore only be effectively scanned from a captive balloon; and such a balloon with each division seems absolutely essential.

In the strategic stage of a campaign a commander-in-chief endeavors to conduct an army into situations where it can best maintain a battle; and in so doing calls to his aid every possible

means of increasing his own and minimizing the enemy's relative advantage at the time of the impact. To deceive the enemy so as to invite him to take certain positions, or to veil one's own movements, great assistance may be rendered by an aeronautical corps; but if only a single balloon is used and if it always accompanies headquarters knowledge of that fact becomes a certain advantage to the enemy.

Napoleon once said that he had all his life been endeavoring to discover what was on the other side of the hill; but less-gifted commanders will now be able to ascertain with certainty, by means of the captive military balloon, knowledge which this great captain wanted but could only imperfectly arrive at by the use of his great reasoning power and intuition. A sufficient and thoroughly equipped aeronautical corps will go far to supply this military want as voiced by the great Emperor, as well as meet the increasing needs in the same direction of commanders in the wars of the future.

---

### TARGET PRACTICE IN THE FIVE PRINCIPAL ARMIES OF EUROPE.

BY CAPTAIN C. S. ROBERTS, 17TH U. S. INFANTRY.

“THE result of battle depends upon the fire of infantry.”  
The changes in the conditions of the battle-field due to improved weapons of warfare have caused many alterations in methods, especially in battle tactics. The danger zone beyond which troops could be safely manœuvred, massed and formed for attack, has been moved back from a few hundred yards to half a mile, and the clouds of powder smoke which hid the battle-field, and masked the movement of troops, have been cleared away by the use of smokeless explosive compounds, instead of the black powders of ten or fifteen years ago. With these changes has come a quick and universal recognition of the principle urged for a hundred years,—that in battle superiority in fire is the one feature upon which success depends. The aim and design of modern tactics is to afford the greatest development to this fire. The purpose of this paper is to notice briefly the means to this end prescribed in the principal European armies; or, in other words, the small-arms firing regulations of the Austrian, French, German, Italian and Russian armies.

In this connection, I should remark that in this article I can only hurriedly go over the ground, and that it is written with no expectation of instructing others. I have found that our present Lyceum requirements can be complied with, with more benefit to the individual, by devoting the period of the school year to some one subject of our profession, rather than discursive reading. In what I shall say with reference to target practice, I am indebted to a work published in Vienna in 1893, written by Captain J. Bihály, Rifle Battalion No. 29, Austrian army, entitled "The Shooting Regulations of the five principal Armies of Europe." The whole subject is exhaustively treated under these heads: 1st, Preliminary School; 2d, School Shooting; and, 3d, Field Shooting.

#### PRELIMINARY SCHOOL.—THEORETICAL INSTRUCTION.

In the German army, only such theoretical instruction is given to recruits as the company commanders deem advisable. In the Italian army, practically no theoretical instruction is given, though the instructors occasionally explain certain theories to the recruits. In the French regulations, the explanation of technical terms to the soldier is authorized, but not required. In Austria, the meaning of such technical terms as *line of sight*, *trajectory*, *angle of fire*, etc., is required to be carefully explained to the soldier. The Russian regulations prohibit any explanation to the private soldier of a theoretical nature.

In all European armies, except the Italian, all officers are carefully instructed in everything relating to shooting, both theoretical and practical.

The Austrian, Italian and Russian regulations allow theoretical instruction to the higher grades of non-commissioned officers in so far as is necessary to enable them to assist the officers who act as instructors. In the French army, all non-commissioned officers are required to have a thorough knowledge of the theory of shooting, and this instruction is given each year so that it is completed before the annual contingent of recruits join their colors.

In the German army, the same conditions obtain, except that this instruction is given in the gymnasias, where selected privates are specially trained and educated for the position of non-commissioned officers. In the Italian army, officers who are to act as instructors are supposed to be thoroughly informed in all that relates to the theory of rifle firing. The elementary instruction of



soldiers in the use of the rifle as a firing weapon is conducted in all European armies mainly as in ours, and the details are practically the same as in the sighting and the position and aiming drills prescribed in our Small-Arms Firing Regulations. The appliances used are similar to ours, and, in addition, mirrors, which aid in correcting faulty positions in the body and piece, and aiming-stands of various patterns for advanced instruction. In sighting, in all the armies, except the Italian, recruits are instructed to use the half-sight. All soldiers are required to aim and fire closing the left eye, except where the right eye is weak, then this eye is closed. As in our service, the off-hand standing position is the fundamental position. In teaching this position, there is required (1st) a certain familiarity with the weight and balance of the piece, and (2d) considerable strength in the muscles of the arm; the recruit is presumably deficient in both.

In Italy, familiarity with the rifle is taught by a course in the manual; in Austria, France, Germany and Russia, by the manual in connection with gymnastic exercises. The French add the bayonet exercise, and both in Germany and France certain exercises with the piece, for the special purpose of strengthening the muscles of the arm.

It is significant, as showing the thoroughness with which preliminary instruction is given in the Austrian, French and German armies (little attention being given to it in Italy and Russia), to note the following mistakes, or errors, in position, to be corrected in the individual recruit:

1st.—The position of the body not free and unconstrained.

2d.—The weight of the body not equally borne on both legs.

3d.—Shoulders drawn unnaturally.

4th.—Position of feet unnatural,—turned out too much, or the contrary.

5th.—Right elbow too high or too low; left hand not at the balance.

6th, 7th and 8th.—Piece not held firmly with right hand, due to imperfect movement of the wrist, which results in the weight of the rifle falling too much on the left arm. Piece not held close to right shoulder, making position unsteady, with consequent loss of accuracy in firing.

9th and 10th.—Butt of piece not pressed back against the shoulder, but against the muscles of the arm.

11th, 12th, 13th, 14th and 15th.—Right hand and arm too high

or too low. Rifle turned to right or left—canted. Head bent too much forward; nose too near the right hand. Head thrown back too far, constraining muscles of the neck, making sighting difficult.

After careful instruction in the off-hand position, comes the kneeling, taught with the same thoroughness. In the Austrian and German armies there is an upright kneeling position, either on one or both knees, in which the rifle is held as in "off-hand."

The lying down position is taught both with and without support. Instruction in pulling the trigger is considered very important in all armies. The exercises are as follows:

1st.—Instructor curves his index finger with the finger of the recruit, to show proper method, and *vice versa*.

2d.—Recruits are taught to open and close first two joints of index finger.

3d.—How to place finger on trigger.

4th.—How to press the trigger with the finger without releasing grasp on piece.

5th.—To hold breath while sighting and pulling trigger.

Then comes the combination of three exercises of position, sighting and pulling the trigger.

Comparatively little attention is paid to gallery practice, though there is some practice had in Germany and Italy with a small gun (room gun).

With reference to this matter, I have long felt that too much attention is given to it in our army, believing that, except as a position and aiming drill, little benefit results, and often much harm, as it tends to make men careless in holding the piece.

Firing with blank cartridges is required in all armies before target shooting is permitted. Austria, Italy and Russia require this practice with fixed bayonets; France and Germany do not.

During this practice, as subsequently, every possible effort is made to correct and overcome the gun-shyness so often found in recruits. Even at this stage, rapidity of fire is considered. According to the Italian regulations, 8 single shots can be fired in a minute "at will"; by command, 6 to 7; magazine fire, 25 shots in two minutes. In the French army, without using the magazine, 12 shots a minute; with magazine, 8 shots in 30 seconds. In Russia, 5 seconds is allowed for each shot, and in rapid fire it is claimed that 20 shots can be fired in a minute. In Austria and

Germany no fixed number is mentioned, but the regulations require so many as can be fired accurately. It is, however, expected, as the results of these various preliminary drills, that the soldier should be able to raise his piece to his shoulder, sight and lower it 15 or 20 times a minute, and to do this exercise for five minutes without rest.

Estimating-distance drill is considered in all European armies of the greatest importance, and the practice is had before the school shooting, or regular practice with ball cartridges, begins.

In Austria and Russia, this drill is continued up to 3000 paces; in Italy, to 2400 paces; France, to 1600 paces. The German regulations require this practice up to 1200 paces (1000 m.), and, beyond this, distance is determined either by map measurements or range finders.

The impossibility of teaching all soldiers to accurately determine distances in the time allowed for this drill is recognized, and it is considered satisfactory if the individual soldier can fix his sights properly, in the Austrian, Italian and Russian armies up to 600 paces, and in the French and German up to 800 paces. The instruction of officers and of special men who show aptitude is continued up to the limit as above. The officers and this special class of men are, in addition, in the Austrian, French and German armies, instructed in the use of range-finders.

In estimating distances, the different regulations prescribe a limit of error. This error for competent estimators is fixed as follows:

In France, at not more than two per cent.; in Italy, 12 per cent.; in Russia, 10 per cent. In Austria and Germany, no limit is fixed for short distances, and up to 600 paces the result is considered satisfactory if the limit of error is within 100 paces. This instruction is imparted by familiarizing each soldier with a certain distance as a unit of measurement.

In the German army this unit varies from 50 to 100 m.; in the Italian army, from 50 to 200 m.; in the French and Austrian armies, from 200 to 400 m.; and, in the Russian army, it is 100 paces.

This unit is supposed to be taken on level ground. The appearance of a man at different distances, as a method of determination, is taught in France and Russia; the appearance of natural objects on the ground, in Austria, Germany and Italy.

Careful note is made of the effect of light, weather, irregu-

larity of contour, etc., and practice is had under all conditions and in all kinds of country.

Records of practice are kept in Austria, Italy and Russia; not in France or Germany. In Italy, the four best men are given a small money prize (5 lire), and their names entered in the company records.

#### PRACTICE WITH BALL CARTRIDGES.

It seems to be established as a fact, recognized in all armies, that in no rifle furnished to troops are the sights absolutely accurate. In order that there should be as little variation as possible, it is provided that what is known as the "half-sight" should be taken as the normal sight, which will allow the individual to become familiar with the firing results of his piece (what we may call the "personal equation"), and enable him to readily correct slight errors in elevation, as well as to right or left. This is the method taught in the Austrian, French, German and Russian armies. The Italian army always uses the fine sight.

The influence of atmospheric conditions is recognized, such as variations in light, temperature and wind. To counteract these influences, the recruits are taught to hold to right or left, or aim high or low, according to fixed tables depending upon the conditions.

In all these armies, this practice is divided into three stages, (1st) preliminary, (2d) main exercises, and (3d) field shooting. Except in Russia, where there are two, the men shooting are divided into three classes, depending upon proficiency attained in practice. In Germany, there is a fourth class, of the most expert shots.

The ammunition allowance per man for the entire practice, divided somewhat irregularly among the different classes, is as follows: Austria, 150 rounds; France, 170; Germany, 140; Italy, 145; Russia, 130.

#### PRELIMINARY PRACTICE.

(To prevent repetition, it may be stated that all distances are given in paces of 30 inches, instead of metres.)

In the Italian army, this consists of two exercises for the 3d class only, at a distance of 334 paces. The 1st exercise, 3 shots standing with rest, 1 shot standing off-hand, 1 shot kneeling, and 1 shot lying down. The 2d exercise, 8 shots off-hand (standing).

The school target is used. This is a rectangle, 2 m. square, in the middle a black bull's-eye 10 c. m. in diameter, with an outer circle inscribed 1 m. in diameter. Value of hits: In bull's-eye, 3; in circle, 2.

In the French army there are three exercises for each class; the distance is 134 paces for all; 4 cartridges per man at each exercise. 1st exercise, standing with rest. 2d exercise, off-hand. 3d exercise, kneeling.

The school target is used, the same size as that used in the Italian army, except that the bull's-eye is 25 c. m. in diameter, with a circle outside 50 c. m. in diameter. Value of hits: Bull's-eye, 2; elsewhere on target, 1.

In the Russian army, only the recruits fire—standing off-hand, distance 100 paces, 4 shots per man, at the school target, which is a rectangle, 178 c. m. high and 133 c. m. wide, divided equally by two vertical lines; the middle space is white and the outer spaces black.

In the German army there are 6 exercises, with from 3 to 6 cartridges at each exercise, depending on the judgment of the instructor. 1st exercise, the 3d class fires 2 series, 2d and 1st class, 1 each; position, standing with rest; distance, 134 paces. 2d exercise, 2d and 1st classes; same position; distance, 200 paces. 3d exercise, 3d class; standing with rest; distance, 134 paces; 2d and 1st classes; standing off-hand; distance, 200 paces. 4th exercise, only the 3d class; standing off-hand; distance, 134 paces. 5th exercise, only the 3d class; standing with rest; distance, 200 paces. 6th exercise, only the 3d class; standing off-hand; distance, 200 paces.

The ring target is used in all the exercises. This is a rectangle, 170 c. m. high and 120 c. m. wide, with 12 circles inscribed, the inner 10 c. m. in diameter, the others 5 c. m. from each other. Value of hits: Centre, 12; decreasing in value by one with each circle. A hit outside the circle on target counts 1.

In the Austrian army, the 3d class has 4 exercises—at 200 paces—standing with rest and standing off-hand; at 300 paces, kneeling; at 400 paces lying down. The 2d class, 3 exercises; at 200 paces off-hand; 300 paces kneeling; 400 paces lying down. The 1st class, 2 exercises; at 300 paces kneeling; at 400 paces lying down. Each soldier fires from 4 to 8 cartridges at each exercise.

The school target is used in all. This is a rectangle, 180 c. m.

high and 125 wide, divided by vertical lines into three sections, the middle one 58 c. m. wide, painted white, the two outer sections light blue. In centre division, 60 c. m. from bottom a bull's-eye  $17\frac{1}{2}$  c. m. in diameter is inscribed, and above this an oval with long diameter 58 c. m. and 42 c. m. wide.

Requirements in order to be considered proficient :

1st exercise.—3d class must hit target 3 times in last 4 shots. 2d and 1st classes must hit the oval once, and twice in centre division, or 4 times in centre division in last 4 shots. 2d exercise. 3d class must hit three times in centre division in last 4 shots ; 2d and 3d classes, once in oval, or twice in centre division, or 4 times in centre division in last 4 shots. 3d exercise. 3d class, 3 hits in centre division in last 4 shots ; 2d class, 1 hit in oval and 2 in centre division, or 4 hits in centre division in last 4 shots. 4th exercise. 3d class, 3 hits in centre division in last 4 shots.

#### MAIN EXERCISES.

These correspond with the regular, or known-distance, firing in our army. In the Italian army, this practice is prefaced by an exercise by the 3d class, lying down, rapid magazine-fire with 9 cartridges, at the school target, distance 334 paces. In the first 6 exercises all classes take part ; 5 shots per man are fired at all exercises, except the 5th and 9th, at which 9 shots are fired. 1st exercise. At 334 paces ; off-hand standing ; firing at will ; at No. 1 target. 2d exercise. At 400 paces ; kneeling, firing at will ; at No. 1 target. 3d exercise. At 534 paces ; kneeling, firing at will ; at No. 2 target. 4th exercise. At 534 paces ; lying with rest, rapid individual fire ; at No. 2 target. 5th exercise. At 200 paces ; lying, bayonet fixed, magazine fire ; at No. 4b target. 6th exercise. At 400 paces ; standing off-hand, bayonet fixed, magazine fire ; at No. 6 target. 7th exercise. At 334 paces ; 2d and 1st classes only ; any position ; individual fire ; at No. 1 target. 8th exercise. At 534 paces ; 2d class only ; lying down, magazine fire ; at No. 2 target. 9th exercise. At 467 paces ; 2d class only ; lying down, with bayonet fixed, magazine fire ; at No. 4b target. 10th exercise. At 267 paces ; 1st class only ; kneeling, individual fire, retiring ; at No. 5 target. 11th exercise. At 267 paces ; 1st class only ; kneeling, individual fire at will ; at No. 3 target. 12th exercise. At 667 paces ; 1st class only ; any position, individual fire at will ; at No. 1 target.

The targets used in the Italian army are as follows : All are



rectangular. (Measurements in all are given in centimetres—3.937".) No. 1. 165 by 135 wide, divided by vertical lines into three sections representing space occupied by 3 men in line. No. 2. 165 high and 225 wide, divided by vertical lines into five sections representing space occupied by five men in line. No. 3. 45 high and 50 wide, with silhouette representing a head,  $\frac{1}{4}$  figure, pasted on. No. 4a. 165 high and 45 wide, with silhouette representing standing figure pasted on. No. 4b. 45 high and 165 wide, with silhouette representing 3 heads,  $\frac{1}{4}$  figures, pasted on. No. 5. 105 high and 45 wide, with silhouette representing kneeling  $\frac{3}{4}$  figures pasted on. No. 6. 225 high and 165 wide, divided by vertical lines into three sections—middle section 95 wide—representing space occupied by a cavalry soldier.

Value of hits: Every hit on the targets counts 1. Hits in middle section of targets Nos. 1 and 2 count 3; in side sections, but 2. Hits in figures on targets Nos. 3, 4 and 5, and in middle section of target No. 6, count 3.

#### CLASSIFICATION.

To go into 1st class, soldiers must have been proficient in the preliminary practice and have hit the target at least once in each of the first six exercises, and have a total of 21 hits, counting at least 51 points. 2d class, soldiers who are proficient in the preliminary practice, but do not qualify for 1st class. 3d class soldiers who are not proficient in preliminary practice.

In the French army, there are twelve regular exercises in which all classes participate. The exercises begin with No. 4 as the preliminary firings count in the series. In the first 10 exercises, the soldier fires at will, 6 cartridges per man; in the last 2, 8 shots per man. 4th exercise. Distance, 267 paces; kneeling. 5th exercise. Distance, 267 paces; standing off-hand

The target is No. 1 for both, which is a rectangle, 200 by 200, with a circle inscribed from centre 100 c. m. in diameter.

6th Exercise.—Distance, 400 paces; standing off-hand; target same as above, except that circle is 150 c. m. in diameter—target No. 2. 7th exercise. Distance, 534 paces; kneeling. 8th exercise. Distance, 534 paces; lying down. Target No. 3, which is the same as No. 1, except that circle is 200 c. m. in diameter, is used in 7th and 8th exercises. 9th exercise. Distance, 800 paces; lying down; division target. This is a rectangle 200 high and 300 wide, with five vertical black stripes dividing target into

six sections, each one representing space occupied by standing figure. 10th exercise. Distance, 267 paces; standing off-hand, bayonet fixed. 11th exercise. Distance, 267 paces; kneeling. Target No. 1 is used in 10th and 11th exercises. 12th exercise. Distance, 334 paces; standing off-hand, bayonet fixed; body target—a  $\frac{1}{2}$  figure silhouette on rectangle 83 high and 50 wide. 13th exercise. Distance, 534 paces; kneeling; at  $2\frac{1}{2}$  figure targets placed side by side. 14th exercise. Distance, 467 paces; kneeling, magazine fire; the targets are 3 standing silhouettes side by side, each figure painted or pasted on a rectangle 166 high and 50 wide. 15th exercise. Distance, 267 paces; standing off-hand, magazine fire, retreating; at abreast, or  $\frac{1}{2}$ -figure, target on rectangle 56 high and 50 wide. Hits in circles or figures count 2; outside in target count 1.

CLASSIFICATION.

1st class must have 75 points; 2d class, 35 points; remainder are 3d class.

In the German army the main exercises consist of 14 exercises in 22 series, 8 exercises for 3d class and 7 each for 2d and 1st classes, each series with from 5 to 10 cartridges, depending upon judgment of instructor. All men fire at will or individually. The numerical sequence of the exercises seem to be entirely disregarded, doubtless for satisfactory reasons, which however I have been unable to discover. I shall describe the exercises in the sequence in which they are given, in the very complicated tables, by Captain Bihàly. In nearly all the exercises figures or silhouettes pasted or painted on rectangles are used, as follows:

Head target, silhouette of head,  $\frac{1}{2}$ -figure size, on rectangle 35 high and 40 wide. Breast target, silhouette of breast,  $\frac{1}{2}$  figure size, on rectangle 50 high and 40 wide. Body target, silhouette of  $\frac{1}{2}$  figure size on rectangle 85 high and 40 wide. Kneeling target, silhouette of  $\frac{2}{3}$ -figure on rectangle 120 high and 40 wide. Standing target, silhouette of whole figure on rectangle 170 high and 40 wide. The section target is a rectangle 170 high and 200 wide, divided by vertical lines into five equal sections, representing space occupied by 5 standing figures in line.

4th exercise.—1st class; distance, 200 paces; lying down with rest; at head target. 4th exercise. 2d class, distance, 134 paces; lying down with rest; at head target. 5th exercise. 1st class; distance, 267 paces; standing with rest behind breast-works; at breast target. 6th exercise. 2d class; distance, 267

paces ; standing with rest behind breastworks ; breast target. 5th exercise. 2d class ; distance, 200 paces ; lying down without rest ; at breast target. 8th exercise. 3d class ; distance, 200 paces ; lying down with rest ; at breast target. 7th exercise. 3d class ; distance, 200 paces ; lying down off-hand ; at body target. 10th exercise. 3d class ; distance, 267 paces ; standing with rest ; at body target. 9th exercise. 3d class ; distance, 267 paces ; kneeling ; at kneeling target. 6th exercise. 1st class ; 400 paces ; lying down off-hand ; at 2 kneeling targets side by side. 11th exercise. 3d class ; distance, 334 paces ; lying down off-hand ; at standing-figure target. 14th exercise. 3d class ; distance, 200 paces ; standing off-hand ; at standing-figure target. 10th exercise. 2d class ; distance, 200 paces ; kneeling ; at standing-figure target. 10th exercise. 1st class ; distance, 200 paces ; lying down off-hand ; at standing-figure target. 7th exercise. 1st class ; distance, 467 paces ; kneeling ; at 2 standing-figures side by side. 7th exercise. 2d class ; distance, 400 paces ; lying down off-hand ; at 2 standing-figures side by side. 8th exercise. 1st class ; distance, 800 paces ; kneeling ; at section target. 8th exercise. 2d class ; distance, 667 paces ; kneeling ; at section target. 12th exercise. 3d class ; distance, 534 paces ; lying down with rest ; at section target. 13th exercise. All classes ; distance, 267 paces ; standing off-hand ; at ring target. Value of hits :—Hits in figures count 1 ; in ring target, hits, to count, must be inside the 6th, 7th or 8th ring, according to class.

#### CLASSIFICATION.

The 3d class consists of the recruits, the near-sighted men, and the old soldiers who have not progressed. The 2d class, those who go through the 3d class exercises with good results ; they are called "good shots." The 1st class, those who have shot through the programme for the 2d class satisfactorily ; they are called "completely good, or sure, shots." Those who have gone through the exercises of the 1st class satisfactorily go into a special shooting-class, and receive advanced instruction.

The Russian regulations prescribe 9 exercises in their known-distance shooting, in five of which the 1st class takes part. All practice with bayonet fixed ; individual fire without time limit ; 4 shots per man in each exercise. The targets are similar to those in the German army, but from 4 to 8 c. m. in height and width larger.

1st exercise.—2d class; distance, 190 paces; standing off-hand; at whole figure on target No. 1. 2d exercise. Both classes; distance, 190 paces; standing off-hand; at whole figure on target No. 1. 3d exercise. 2d class; distance, 190 paces; kneeling; at body,  $\frac{1}{2}$  figure target No. 1. 4th exercise. Both classes; distance, 190 paces; lying down; at head,  $\frac{1}{2}$  figure, on target No. 1. 5th exercise. 2d class; distance, 285 paces; standing; at whole figure on target No. 1. 6th exercise. Both classes; distance, 285 paces; standing; at whole figure (silhouette) on target 178 by 44. 7th exercise. Both classes; distance, 285 paces; kneeling; at body,  $\frac{1}{2}$  figure, on target No. 1. 8th exercise. 2d class; distance, 380 paces; lying down with rest; at 2 bodies,  $\frac{1}{2}$  figures, on target No. 1. 9th exercise. Both classes; distance, 760 paces; 2 shots are fired lying down with rest, and 2 shots kneeling, at 6 whole-figure silhouettes on target No. 2, or division target, size, 178 high and 264 wide, divided by vertical lines into 6 equal sections, in each of which a whole-figured silhouette is pasted. Hits in figures, only, count, as in our skirmish practice.

#### CLASSIFICATION.

1st class must make 50 per cent.; the men under this, and all recruits, 2d class.

In the Austrian army there are 9 series in their main exercises, each with from 4 to 8 cartridges, except the last, in which there are from 6 to 12, depending upon results. The men are not limited in time, except in the last two exercises. The targets are all figures (silhouettes) pasted on rectangles, similar to, but generally larger than, those used in the German army. Beginning with the 3d exercise. 1st class only; distance, 200 paces; lying down, firing from behind cover; at head target,  $\frac{1}{2}$  figure. 4th exercise. 1st class; distance, 300 paces; kneeling; firing from behind cover; at breast target,  $\frac{1}{2}$  figure. 4th exercise. 2d class; distance, 200 paces; lying down; at breast target,  $\frac{1}{2}$  figure. 5th exercise. 1st class; distance, 400 paces; lying down with bayonet fixed, firing from behind cover; at  $\frac{1}{2}$  figure target. 2d class; distance, 300 paces; lying down with bayonet fixed, firing from behind cover; at  $\frac{1}{2}$ -figure target. 3d class; distance, 200 paces; lying down; at  $\frac{1}{2}$ -figure target. 6th exercise. 1st class; distance, 500 paces; kneeling, firing from behind cover; at kneeling target,  $\frac{3}{4}$ -figure. 2d class; distance, 400 paces; lying down with rest, firing from behind cover; at kneeling target,  $\frac{3}{4}$ -figure. 3d class; distance,

300 paces; lying down, bayonet fixed, firing from behind cover; at kneeling target,  $\frac{3}{4}$ -figure. 7th exercise. 2d class; distance, 500 paces; kneeling, firing at will; at whole figure target. 3d class; at 400 paces; lying down with rest; at whole-figure target. 1st class; distance, 600 paces; kneeling, firing from behind cover; at 2 whole-figure targets. 8th exercise. 2d class; distance, 600 paces; kneeling; at 2 whole-figure targets. 3d class; distance, 500 paces; kneeling; at 2 whole-figure targets. 1st class; distance, 300 paces; kneeling; at  $\frac{3}{4}$ -figure target, moving. 9th exercise. 3d class; distance; 300 paces; kneeling; at 3 whole-figure targets. 10th exercise. 3d class; distance, 200 paces; kneeling, by command; at  $2\frac{3}{4}$  figure targets. 11th exercise. 3d class; distance, 200 paces; standing, with bayonet fixed, rapid fire; at  $2\frac{3}{4}$ -figure targets. Only hits on figures count.

#### CLASSIFICATION.

Recruits are in the third class, and all soldiers who are not proficient for advancement. 2d class. Those who shoot through the exercises for 3d class and make 40 per cent., 1st class, those who shooting as 2d class make at least 50 per cent.

In the German Jaeger troops, which are small battalions of selected riflemen, the course of instruction in rifle firing is much more extended, and consists in 18 series for 1st class, 20 series for 2d class, and 19 series for 3d class, in individual, rapid, and magazine fire, in all positions, at distances from 200 to 800 paces. The targets are practically the same as those used by the other German troops. 125 shots per man are allowed, and the results necessary for proficiency are from 60 to 100 per cent. of possible scores, depending upon distance and size of targets.

In addition to the practice previously noticed, in Austria and Germany a course of instruction in night shooting is given, with and without artificial light.

With the completion of the main exercises, the individual instruction of the soldier, in all that relates to the rifle as a shooting weapon, is finished. The field shooting, or battle exercises, which follow, are intended for the instruction of the soldier as a component of a group, section, zug, or larger body of troops, and in which his individuality is merged. Their purpose is to accustom him to the noise and excitement of battle conditions, to teach him fire discipline, to unhesitatingly obey the orders of his superiors, however imparted, to cultivate a spirit of self-reliance

necessary to enable him to act for himself should the fortunes of battle temporarily separate or deprive him of his leader. The targets used are silhouettes representing an enemy, infantry, cavalry and artillery, in open order, single groups, lines or masses, at varying unknown distances.

The exercises are conducted, 1st, as a drill without cartridges, the march in column, the successive deployments, the advance to attack and the formations incident thereto ; in a word, to rehearse or simulate the various phases of battle ; 2d, the same exercises with blank cartridges, and, 3d, with ball cartridges. The purpose of these series of exercises cannot be better explained than by epitomizing a free translation of Captain Bihály's text. Under the head of the elements of battle shooting for the private soldier, he notes:

1st.—The march in column up to the point where fire becomes effective. 2d. The fire of infantry at long distances against artillery or masses of troops of other arms. 3d. The deployment from close order into open order, and teaching the proper use of cover. 4th. The effect of volleys at distances from 1500 to 700 paces. 5th. The use of the different kinds of fire as shown in the previous instruction. 6th. The employment of intervals in fire action to renew the supply of ammunition. 7th. The forward movement by rushes. 8th. To make the soldier self-reliant under circumstances when he must act on his own responsibility. 9th. The instant obedience to command, to quit firing at the instant when a forward movement is ordered ; the rapid opening of fire ; the quick rallying after attack, and the taking up of rapid fire again.

The following are among the elements necessary for the instruction of leaders from the group to the company commanders :

1st.—The effective long-distance fire of company, zug, or group in close order. 2d. To enable the leaders to judge the way the battle is moving (in the sense of direction rather than result). 3d. The opening of fire, proper time, etc. 4th. To enable them to direct the kind of fire and the object to aim at. 5th. To fix distances, and observe and estimate the effect of fire. 6th. To keep up rigid fire discipline ; when and how to take advantage of cover. 7th. To look after the renewal of ammunition. 8th. To replace leaders. 9th. The proper time for putting in the reserve.

In the further discussion of the principles of battle-shooting



for the instruction of the private soldier, our author remarks: "That while the march to the field of battle, in close order, up to the point where fire becomes effective, has perhaps nothing to do with the employment of fire, yet the results of this fire are measurably influenced by this march, and for this reason, that in actual war troops are usually engaged after a more or less fatiguing march with full loads. Before going into action their ordinary loads are increased by adding to the ammunition supply from the company or battalion reserve, so that the fire of the soldier will be of poorer quality if he be not inured to the work by actual drill with full packs. We must therefore inquire, before estimating probable results, whether the soldier has been prepared, in time of peace, by carrying the weights necessary in war.

It may be said at this point that, in all European armies, at all times except during the elementary instruction in the barrack yard, soldiers always drill with loaded packs, and this applies as well during all rifle instruction except the early preliminary stages.

The practice in field-shooting at long distances has a direct influence upon the use of this fire in battle. Without this practice with ball cartridges, the soldier can never obtain a measure for estimating the value of his fire. This value he should be able to estimate, so that he may know how valueless it is against loose or deployed lines, and, on the contrary, how great its effect when properly directed at masses in close order and deep formations. Far more important is the knowledge of the effect of such fire for the leader, who thereby gains the experience requisite to properly direct and control it. In all European armies, practice in long-distance firing is had at appropriate targets, so that its effect can be accurately determined. In all armies except our own (and I regret to be forced to make this exception), systematic instruction is given in the deployment from close into open order, with the enemy indicated, with and without blank cartridges, the effective use of volleys, of the different kinds of individual, collective and magazine fire, the methods of carrying cartridges so that they can be handled quickly, and the distribution of ammunition in action.

The advance by rushes, the opening of rapid fire and its instant and simultaneous cessation at command in order to make another advance, are not only practiced, but practiced with ball cartridges.

The soldier is instructed while estimating distances to fix his sights properly for different ranges, and that he may do this intelligently amid the confusion and excitement of battle he receives special instruction. The same is true with reference to the kind of fire, where the decision is left to his own judgment. The execution of the attack, the rally afterwards, what to do, and how, when separated or deprived of his leader, are all matters in which the soldier's action should be governed by experience gained from preliminary training under similar conditions.

I shall omit any detailed explanation of the exercises with blank cartridges, other than to say that in the Austrian, French, German and Italian armies they are extensively practiced and are considered very important.

The field and battle exercises with ball cartridges are conducted in all the principal European armies in accordance with the same general plan, beginning with varied preparatory exercises, and ending with the main exercises in which detachments of considerable size work out given tactical problems.

I propose, as briefly as possible, to notice the different exercises as practiced in the different armies:

#### FIELD-SHOOTING WITH BALL CARTRIDGES.

The Italian regulations prescribe 13 exercises with ball cartridges, 10 classed as preparatory and 3 main exercises, as follows:

1st exercise.—2 groups in open order, lying down; sights fixed at 733 paces by command; slow, individual fire, 3 cartridges per man; target 15 m. long and 45 c. m. high, representing 2 groups deployed and covered except that heads are visible. 2d exercise. 2 groups deployed kneeling; distance, 800 to 1200 paces; sights fixed by leader; 4 cartridges, rapid fire 30"; target representing 2 groups in open order standing, 15 m. long and 165 c. m. high. 3d exercise. Zug in close order, standing; distance, 1067 to 1600 paces; volley fire by command of zug leader, who gives elevation and object; 4 cartridges per man; at same target, representing an advancing line of skirmishers. 4th exercise. Zug; position according to cover; distance fixed at 667 paces; sight 600 paces; magazine fire, 9 cartridges per man; target 15 m. long and 30 c. m. high, representing 2 groups deployed, well covered. 5th exercise. Company, peace strength; close order, standing; 1334 to 2267 paces; high sights, fixed by command; collective fire, 8-cartridges; targets are rectangles of appropriate dimensions, rep-

representing a battery of 6 guns with complement of men. 6th exercise. Company, at peace strength; distance, 934 to 1600 paces; sights and kind of fire fixed by company commander; 6 cartridges per man; targets 4 division in line, representing heads of 4 zugs in single rank. 7th exercise. Company, peace strength, in 2 zugs, one as firing line, the other as support, under difficult battle conditions; distance, 1200 to 800 paces; company commander at proper distance deploys firing line, gives necessary directions to fire, 10 cartridges per man, with proper intervals, orders support to deploy and reinforce firing line, taking position in intervals, and fires 5 cartridges per man. The targets represent a zug in extended order advancing, and a zug in close order as support 100 paces behind,—size, 1st 30 m. long and 45 c. m. high, 2d, 9 m. long and 165 c. m. high. 8th, 9th and 10th exercises. Company, at peace strength, against an enemy indicated. In these exercises, the commanding officer is governed by the conditions of the battle, either on the offensive or defensive. The distances are absolutely unknown, and when the targets representing the enemy are discovered commander makes proper dispositions. 24 cartridges allowed for the 3 exercises. 11th exercise. Company, at war strength, 25 cartridges per man. 12th exercise. Battalion, at war strength, 25 cartridges per man. 13th exercise. Larger bodies of troops, such number of cartridges as may be ordered.

These are main exercises. In the 11th exercise, the company advances to the attack in close order, deploys a firing line with supports and reserve, and goes through all preparatory stages up to final attack, including advance by rushes. The 12th and 13th exercises are supposed to represent an attack upon an enemy in position indicated. The commanding officer is supposed to direct the proper method of advance, make the proper dispositions of supports and reserves, order the firing line reinforced, take advantage of terrain to prevent unnecessary loss, to maintain order and rigid fire discipline, go through the methods for replenishing the supply of ammunition, put in the reserves, and at the proper time make the final attack. The targets in all these exercises are in accordance with the task presented.

In the French army, there are 11 exercises with ball cartridges, 1 to 6 preliminary, 7 to 9 in battle shooting, and 10 to 12 main exercises.

1st exercise.—A group, standing or kneeling, in extended

order; volley fire, at 800 paces; target, a group of 7 standing figures. 2d exercise. Half zug; standing or kneeling, in extended order; volley fire, at 1067 paces; target, a half zug—14 standing figures. 3d exercise. A zug; same position; volley fire, at 1334 paces; target, 28 standing figures. 4 cartridges per man are allowed for each exercise, and they (the exercises) are especially intended to instruct the leaders in the use and effect of volley fire. 4th exercise. A zug; standing or kneeling; distance fixed 1067 paces; rapid volley, 8 per minute, using magazine, 8 cartridges per man. 5th exercise. A zug; position not fixed; distance, 800 paces; quick opening of collective fire after a rush of 100 m., 6 cartridges per man. Targets for both exercises, 28 standing figures. The exercises are intended to instruct the zug commanders in the direction and effect of the fire employed. 6th exercise. A zug; position not fixed; distance, 467 paces; sights at 534 paces; rapid fire at will after 100 m. rush; target, 28 standing figures. This exercise is intended for the instruction of officers and men in fire discipline, to cease fire instantly at command; 6 cartridges per man. 7th exercise.  $\frac{1}{2}$  zug; any position; 800 to 1334 paces. 8th exercise. Zug; any position; 1067 to 1600 paces.

These are called battle exercises; in both, volley fire at different distances by command of leaders, who direct elevation and are allowed the use of maps to ascertain distances. They are supposed to observe the effect of fire, and to make such changes in sights as are necessary; 6 cartridges per man at each exercise; targets, 14 or 28 standing figures representing  $\frac{1}{2}$  zug or zug in line. 9th exercise. Zug; battle conditions; 1067 to 1600 paces; volley fire at different ranges by command of zug leader, who determines distances by range-finder; 12 cartridges per man; target, a zug, 28 standing figures. 10th exercise. Company, at war strength; 1067 to 267 paces; 12 cartridges per man. 11th exercise. Battalion, at war strength; 1067 to 267 paces; 14 cartridges per man.

These are main exercises. Commanding officers are supposed to make proper dispositions and move forward to attack, direct employment of suitable fire, take advantage of cover, order the necessary reinforcements to firing line, make the final attack and the subsequent rally, etc. The targets represent a company or battalion in battle formation.

In the Russian army, 11 exercises in battle shooting are pre-

scribed. The series are numbered in continuation of the main exercises, beginning with No. 10.

10th exercise.—Group in extended order; lying down or kneeling; distance, 400 paces; sights fixed at 200 paces; 6 cartridges per man; slow fire, 3 shots, then rush forward, halt at command, and fire 3 more. Targets,  $\frac{1}{2}$  figure, 4 paces apart, same number as in attacking party. 11th exercise. Group as above; same as above, except quick fire is used and the targets are whole figures. 12th exercise. Group as above; rush forward twice, with 30" rapid fire after each; 8 cartridges per man. Targets are  $\frac{1}{2}$  figures, as in 10th exercise. 13th exercise. Group in extended order, lying down or kneeling; distance, 500 to 700 paces; 6 cartridges per man; slow fire, after rushes; sights fixed and distances estimated by the men. Target, 3 whole figures close together. 14th exercise. Group as above; 500 to 700 paces; volley fire; 6 cartridges per man, 2 each lying, standing and kneeling at three distances; leader to order sights and estimate effect of fire. Target, 6 whole figures close together. 15th exercise. Half company; distance, 1000 to 1600 paces; soldiers shooting with high sights; volley firing, 3 volleys each, in close order, loose order and extended order, at each volley part of the company to use one sight and remainder another; distances to be estimated and sights fixed by commanding officer; target representing 6 guns in position, 6 targets No. 2, 15 or 20 paces apart. 16th exercise. Half company; distance, 1700 to 2200 paces; soldiers using high sights; 3 volleys per man at 3 different distances, in open order; commanding officer to estimate distance and give orders for sights; target, representing open company column, 20 targets No. 2, in 4 lines, 20 paces between each line. 17th and 18th exercises. Company, at peace strength; 2200 paces, advancing to 200 paces; 18 cartridges allowed in each exercise; in each, company is formed and moved forward to the attack in three lines; purpose, to instruct the soldier in firing under battle conditions; company commander to give all necessary orders relating to kinds of fire and general directions as to attack; subordinate officers to control fire and compel rigid fire discipline. Target, representing 1 or 2 companies, in 3 lines; 1st line 15 $\frac{1}{2}$ - and 15 $\frac{1}{4}$ -figure targets, support 15 whole-figure targets, reserve company column,—20 targets No. 2 and 1 gun (1 target No. 2). 19th exercise. Company, at war strength; 18 cartridges per man. 20th exercise. Larger bodies of troops

with artillery; cartridges as ordered. In these exercises, the commanding officer is supposed to execute a tactical movement, with an enemy indicated, but exact position unknown, to give all orders relating to disposition of his command, the formation for attack, etc. The targets are such as are appropriate to represent the enemy disclosed.

In the German army, there are 6 exercises in battle shooting 5 of which are classed as preparatory and 1 main exercise.

1st exercise.—Single man; firing in all positions; distances from 150 to 600 m.; judges distance and fixes sights himself. 2d exercise. Two men; conditions same as above, except that the men fire alternately, each in turn observing where his comrade's bullet strikes. In these two exercises, the object sought is to teach the soldier how to use his rifle with best results, to estimate distance and fix his own sights, to aim and fire rapidly and judge its effect, and, beyond all, to afford the experience necessary to make the individual self-reliant when deprived of leader. 15 cartridges are allowed per man for the 2 exercises. The targets are individual figures or groups of figures arranged according to range and probability of hitting. 3d exercise. A group. 4th exercise. A zug. 5th exercise. A company. In these exercises, the targets are figures representing an enemy, placed as required by circumstances, and in number corresponding with the troops manœuvring. The distances are all unknown, 30 cartridges per man are allowed. The leaders are supposed to manœuvre their respective commands, taking into consideration the terrain and indicated battle conditions, to properly direct and control the fire, to estimate its effect, etc. For the soldier they are designed to teach fire discipline, the instant and unhesitating obedience to the orders of his superiors, however indicated, how to conduct himself in attack or defense, how to take advantage of cover and when, and, finally, to familiarize him to a degree with the noise and excitement of battle. 6th exercise. A battle exercise, in which a larger body of troops is manœuvred as in actual battle, against an enemy indicated and in accordance with the problem to be executed. The commander is presumed to judge quickly and act promptly and wisely in all the phases presented. It is designed to afford all officers experience in controlling and handling men under battle conditions. An important feature of this exercise is the supplying the firing line with



ammunition. Map measurements and range-finders are employed in determining long distances. The number of cartridges to be used depends upon the orders issued. The targets are appropriate to the task, and so placed that results can be known and the value of fire estimated.

In the Austrian army, there are 6 exercises in battle shooting, of which four are classed as preparatory.

1st exercise.—Is the same as in the German army, with from 10 to 30 cartridges, according to proficiency shown. 2d exercise. A group; distance, 1000 to 200 paces; target, group deployed. 3d exercise; A zug; distance, 1000 to 200 paces; target, zug deployed. In these exercises the leader is supposed to instruct his command under assumed battle conditions, under the same general plan as in similar exercises in other armies. 25 cartridges are allowed for the two exercises. 4th exercise. Company, at peace strength, shooting with high sights at a target representing a company column and a battery in action; distances, 3000 to 2500 paces, 4 cartridges per man, fire as ordered by leader, 2500 to 2000 paces, 3 cartridges per man, fire as ordered by leader, 2000 to 1500 paces, 3 cartridges per man, fire as ordered by leader. The exercise is designed to give experience in long-range fire and to show the results which may be expected when the fire is properly directed. 5th exercise. Company or battalion, war strength; 25 cartridges per man. 6th exercise. Larger infantry detachments, with artillery; amount of ammunition as ordered. In both exercises, the targets are of appropriate size to represent the troops engaged, and so placed as to indicate probable battle disposition. In these exercises the commanders manœuvre their commands in accordance with the problem presented, the object to be attained being the same as in the similar exercises in other European armies. The methods of replenishing ammunition supply are practiced.

With the finishing of battle-shooting, the firing instruction of the soldier is ended. It must, however, be remembered that for the private soldier the same course is gone over for at least two successive years, and for the non-commissioned officer and officer of higher grades indefinitely, or so long as they remain in the active army. During the autumn manœuvres which follow, though they are intended rather for the exemplification of problems in strategy, or grand tactics, the elements and principles of the previous instruction are kept constant in view, and the viola-

tion or ignoring of any of them would subject the offender to prompt censure.

The scope of this article does not include any criticism as to methods employed in foreign armies to train the recruit by progressive instruction until he becomes presumably proficient in the use of his rifle under all conditions. Nor does it involve any comparison with our own system, but I think it must be acknowledged by all familiar with the subject that, while we have in our army perhaps a larger percentage of target-shots, due largely to our lavish expenditure of ammunition in known distance firing, our instruction in battle-shooting is practically valueless. No matter how thoroughly we may study the theory of rifle practice, knowledge can only be gained by practical experience. The eye and hand must be educated to act together before a man can become a good target-shot, and this appears to me to be the *magnum opus* of our system. How vastly more important, for all of us, that we should have practical instruction, in leading, directing and estimating the effect of fire, in fire discipline, in the proper use of terrain, and the numerous other germane matters which the European soldier must learn unless he is an idiot.

---

## SOME GREAT COMMANDERS OF HISTORY.

BY CAPTAIN EDWARD FIELD, U. S. ARTILLERY.

THIS is an age of readjustments. Its distinctive mental process seems to be a revaluation of the judgments of the past.

A flood of side-lights in the shape of memoirs and reminiscences, has recently been turned upon Bonaparte; and however it may affect his character in other respects it has left his military reputation unchanged. In view of this there may be profit in so grouping the other and preceding masters of the art of war that the relation of each to his age and the development of his profession, may be considered and weighed.

To do this properly we must remember that war is an art, and not a science where the result is all important, and the process but the scaffolding which supports it. While from the broader and higher standpoint of our present intellectual view, the philosophy and sciences of the ancients are valueless, and only to be

consulted by the curious, we may still turn to the ancient masters of war with the same respect and admiration which we feel for ancient sculptors. The military system and armament of modern Europe bear the tool-marks of the inspired hands which assisted in its evolution.

We will begin with Alexander of Macedon.

What greater undertaking than the conquest of the known world was ever imagined? To merely dare such a feat must challenge the admiration of mankind, but to dare and do was the privilege of the world's youth—that glorious youth, nurtured on tales of gods and heroes, with few rules of right, and small consciousness of sin, and therefore sublime faith in man's capacity. It produced in every walk of the intellect masterpieces which the complex civilization of to-day has not ceased to admire. And the very flower of this splendid spring-time, the inheritor of the poets, the statesmen, and the orators, was the young Alexander.

He received from Philip of Macedon an admirable organization which he tested in the Theban war. He then threw himself on the Colossus which overshadowed his earth with a fierceness which seems madness but was in reality profound wisdom.

In his first battle he crossed a swift river whose banks were packed with dense masses of the enemy, struggled through the current till he found firm footing, launched his cavalry as a wedge is driven into the wood, while behind the cavalry rolled his invincible phalanx scaled like a tortoise with bucklers and breast-plates, and bristling with pikes. The report of this victory over the satrap of the great king spread from mouth to mouth and grew as it spread, the terror of his name marched before him, and his next battle was won practically before it was fought.

No man ever attacked with the superhuman fury of Alexander, and no man ever pursued with a more relentless and untiring vigor. His opportunities as a strategist were limited, for Darius abandoned the plains of Assyria where his light cavalry could have terribly harassed the heavily-armed Greeks, and chose to fight at Issus where his enormous host was so closely packed that three-fourths of his army was powerless, and only served to spread the panic and turn retreat into frantic rout. But at the wonderful siege of Tyre, where every move of the most skilled mechanics and the most ingenious people of the ancient world was met and overcome by a counter-move, Alexander displayed resources which make it evident that in his fertile brain fore-

thought and calculation as well as daring and vigor, were present. And above all his other qualities shone that sublime belief in himself and his ability which made of each obstacle a trumpet-call to glory and deemed every achievement but the stepping-stone to greater deeds.

Turn to the mighty Carthaginian. There is something terrifying in the patient and subtle intellect which led an enemy on from one false step to another till the moment when the fox became the lion, and not only defeat but, as at Cannæ, practical annihilation overtook the foe. Men were to him as an open book.

Flaminius was brave and skillful, but hot tempered and anxious to have the credit of finishing the war. Hannibal passed by Flaminius's intrenched camp as if it were empty, and unconcerned by his proximity fell to ravaging the country. The Roman could contain himself no longer. Pride and patriotism both urged him on. He pursued the spoiler. Hardly noticing the ground in his eagerness he entered a defile to meet a death-trap. The passage was blocked, while from the tops of the hills on either side swarms of fleet-footed Spaniards and Libyans rushed upon him. The Romans were annihilated.

Subsequently opposed to a cautious veteran and a rash demagogue, commanding on alternate days, Hannibal so manœuvred as to offer battle each day, calmly confident that sooner or later the politician would insist on trying his hand. The result of this calculation was Cannæ.

For fifteen years he maintained himself in a hostile country, without practical assistance from home. During that time he never lost a pitched battle, he commanded mercenaries from half a dozen nationalities, and never suffered a revolt.

And what soldier of any period ever had a grander conception than that of moving upon Rome, not up through the peninsula full of the memories of her triumphs, and among peoples who had accepted her sovereignty—but over her great barrier, the Alps, which she left undefended, not dreaming that any mortal would have the hardihood to lead an army through their fastnesses. The passage of the St. Bernard by Bonaparte, in summer and opposed only by natural obstacles cannot be compared in difficulty to that of Hannibal, fighting his way through the wild mountaineers who attacked him with barbaric fury.

In the spring he left New Carthage in Spain with 90,000 foot

and 12,000 horse ; he detached Hanno with 10,000 foot and 1000 horse to hold the passes between Spain and Gaul ; and arrived in Italy in October, with 20,000 foot and 6000 horse, nearly three-fourths of his infantry and half his cavalry lost on the way. With the remnant he met and defeated army after army of the most able and valiant race of the world, to the number it is estimated of 200,000 men ; and brought the great Republic to the very verge of ruin. She opposed to this great man an equally great spirit, and as there was behind Hannibal a nation of hucksters and traders, it was well for the world that the Republic won. But to his eternal glory be it remembered that he devoted to a sordid and ungrateful country a mind as far-reaching as has ever been given to man, and a heart which never beat with one throb of selfish ambition.

Cæsar strikes the student as a man of consummate ability, adroit, resourceful, eloquent ; with that noble courage which dreads nothing except fear. Who made himself a master in war as he did in oratory, as he did in literature, as he would have done in anything to which he turned his hand. But his first campaigns were decidedly experimental. He lost opportunities and committed faults. At the foot of Vosges mountains he allowed Ariovistus, the German king, to march around his flank during an entire day. What would have happened to one who had tried such a thing with Hannibal ? He allowed himself to be surprised and almost ruined by the Nervii for want of an ordinary reconnoissance.

He was at his best in Gaul, after he had passed the 'prentice period. There he could always make the hot-headed and war-loving enemy fight when he wanted to, and when he didn't want to he could withdraw into his intrenched camp, leaving them to wear themselves out in futile attacks. But even the work of his maturer genius was cramped by the conditions of Roman warfare which, insisting on a fortified camp each night, was not favorable to the freedom and energy which stamp the work of the great masters of war. When in the civil war he met the Romans, and was compelled to fight their legions, he resumed the old methodical method. Afranius, Pompey's lieutenant, was not an able man but he commanded good troops. Cæsar was either unable or unwilling to bring him to a general engagement, but followed him from place to place, bribing, coaxing, doing everything but fighting till Afranius' provisions were exhausted, the

loyalty of his men thoroughly undermined, and there was nothing left for him to do but surrender.

When Cæsar met Pompey the system of intrenching had reached such a point that they seemed actually unable to get out of their camps, or at each other. Finally Cæsar left Epirus and went into Macedon to induce Pompey to follow him. He hoped the latter would give him the chance he seemed unable to grasp for himself. But when Pompey arrived the process began again, and but for the impatience of the young nobility in Pompey's army, who insisted on his giving battle, it might have gone on indefinitely. Necessarily, a certain kind of ability is required in this war of intrenchments, but it is not great warfare, such as Hannibal, or even Turenne, made it.

As a tactician Cæsar has had many superiors. He took the legion from Caius Marius, a great tactician; and made no important changes. Those that he did make were of doubtful utility. It is difficult to see the advantage which the cohort possessed over the checker-board formation of the maniples; and it certainly tended to reduce that flexibility which had been the legion's strongest point. This flexibility had given the latter its advantage over the hitherto invincible phalanx of Macedon, and enabled it to open its files when the dreaded elephants of Pyrrhus charged, thereby compelling them to run the gauntlet of spears and javelins till maddened, the beasts turned with blind fury upon their own ranks, to carry death and destruction to their masters.

He was not especially energetic in pursuit, and there was in his attacks neither the sublime fury of Alexander, nor the subtle devices of Hannibal.

As a strategist he ranks higher, for his mind was a truly imperial one, and in both war and politics he rarely failed to see the true objective and to follow it undeviatingly. In Gaul he utilized thoroughly a central position, and protected the flanks of the province by crushing the Helvetii and forcing back Ariovistus. Having once driven the Germans to their own side of the Rhine, he made friends with them, and induced them to let him plant intrenched camps in their midst.

His greatest achievement, one of the greatest in any age, was the siege of Alesia. There, the unflinching courage with which he met an enormous relieving army while continuing his investment and the resources with which he faced each



new emergency place him among the ablest men the world has seen.

It is necessary to dwell somewhat upon these ancient leaders, in order to show how little the higher branches of warfare advanced between their time and the date of the Corsican's advent. In reviewing the more modern masters of the art we will consider only those who materially affected its development. And the 16th century, notwithstanding its brilliant soldiers, seems to me to present no name worthy to be placed beside them. There were no great commanders on the European continent; and Cortez, though his deeds in Mexico are among the greatest of individual achievements, exercised no influence upon the profession of arms in the old world.

The beginning of the next century witnessed the full restoration of infantry. It was a vital change, without which scientific war could never have been renewed. And the man who did more than all others to bring it about was the Swedish king, Gustavus Adolphus.

He was a man of marked originality, and revolutionized tactics by substituting a shallower and more flexible formation for the deep masses in which infantry was then drawn up. He was the parent of both drill and manœuvre, for beside substituting the musket for the pike, he taught such skill in the use of the new weapon, that it is said his men fired three times to their opponent's once. And he handled the wider front with such skill, that his attack against the unwieldy masses of the Imperialists was as that of the swordfish against the whale.

As a strategist he was over-cautious, almost timid. He would not advance from the shores of the Baltic until he had reduced all the fortresses on the Oder; and he allowed Tilly to capture Magdeburg because the Elector of Saxony would not permit him to occupy Wittenberg, and without the possession of Wittenberg he would not cross the Elbe. In this respect he could not rise above his age which had not yet mastered the idea that a fortress need not be reduced before an army may advance.

His great work, the honor of which he shares with no one, was the elevation of the soldier's character. He found it at the lowest ebb in the long history of warfare.

The Greek soldier was a citizen: the army of Greece a true national militia. So, too, was the Roman army in Rome's best days; it was from the fields and farms that the men came to de-

fend the Republic against the transcendent ability of Hannibal. In the middle ages chivalry humanized war, partly from sentiment, largely, too, from interest—for the price of a knight's ransom was often his captor's fortune. But in the century preceding Gustavus war was but organized brigandage, and armies simply condottieri on a large scale.

If any one wishes to know what a horrible trade war was at that period let him read of the Sack of Rome by the Black Bands who flocked to follow Bourbon the traitor or the taking of a town in the Netherlands by Alva's Spaniards.

The 176 Articles of War which Gustavus drew up and ordered published once a month to every regiment in his command, might be termed "The Whole Duty of Man." He who obeyed them would fulfil his obligation to God and his fellows.

Robbery and license became unknown. Morning and night the regiments were gathered around their preachers. And though after his death war degenerated again into a savage carnival of blood and plunder, the good seed had been sown. It had been proved that honesty and decency make men better soldiers; the robber gradually disappeared; and war partook more and more of the character of a profession, acknowledging some principles and exercising some restraint.

The other great names of the century are Condé, Turenne, and Marlborough.

Condé was the first to free himself from the restraints which had so hampered Gustavus. A prince of the blood, gifted with daring equal to that of Cortez; he had opportunities denied to men of meaner birth; and boldly broke through the teachings of the Nassaus who would have had war a succession of sieges, and only allowed battle as a last resort.

The first battle which he commanded was a revelation to an era of coldly methodical warfare. He made no changes in disposition. His cavalry was still on the flanks, as it had been at Issus and Pharsalia. But he passed a difficult defile in the face of a veteran army, routed the opposing cavalry, and then returned to the centre, where undismayed and impenetrable, stood the renowned infantry of Spain. He brought up his artillery, an arm still in its infancy, which had never before played an important part; shattered their deep ranks, and then charged with his mounted gendarmes until the magnificent body was destroyed.

It was more than a victory which the young conqueror had

won—it was a revolution. On the bloody field of Rocroy the sun of the Spanish empire went down. France succeeded to the prestige of her arms. And by the end of that century a power which, under Charles V. and Philip II. had aimed at universal dominion and threatened the world, was a stranded wreck, over which France, Austria and England wrangled and fought.

At Fribourg he again disregarded the strength of the enemy's position and the difficulties of the ground, and at Nordlingen, after one of his wings had been beaten and his centre pierced, he succeeded by a marvellous combination of daring and tenacity, in restoring his lines, and finally in winning the day.

He was the very genius of the battle-field, and not since Alexander's cavalry clove a pathway through three hundred thousand foes to Arbela, and Hannibal slowly retired his centre at Cannæ in order that his wings might crush the legions, had such war been seen.

Condé's pupil, his rival, and subsequently his master in strategy, was Turenne—the most scientific soldier the modern world had yet produced.

Turenne learned the art of war during the minority of Louis XIV. For the greater part of that turbulent time civil war raged throughout his country; and one faction turned to him as naturally as did the other to Condé. In all military matters he was supreme, and no one interfered with his authority. No situation can be imagined, better calculated to develop the latent possibilities of a commander.

His opponent, while inferior in strategy, was decidedly superior in battle; and the intense rivalry which the two felt for each other sharpened every faculty in each. The stake was practically nothing—the mere success of a faction; the game everything. Under such circumstances an ambitious leader plays for his own hand, and does not hesitate to run great risks if the reward is proportionately large. It is the fencing-school of war. From such a school Turenne came forth a master of his profession.

The brilliant and daring qualities which Condé developed on the field of battle Turenne introduced into his marches. Yet it is curious to note how nearly in a circle war had revolved for the nineteen centuries which preceded his coming. No strategic march of his can fairly be placed above that upon the river Metaurus, by which the consul Nero intercepted Hasdrubal as he

brought reinforcements to Hannibal, destroying his force and returning to confront Hannibal with such speed that that crafty Carthaginian had literally never missed him—the ghastly spectacle of his brother's head was the first intimation he had of the ruin of all his hopes. Turenne's great masterpiece, the concentration of his forces in mid-winter, and the dash into the very midst of the enemy's line at Colmar, carrying one position after another, and compelling the abandonment of the whole line, almost rivals it in the boldness of the execution. But one was done during a cessation of hostilities, when vigilance is apt to be relaxed—the other in the crisis of the world's fate. In one it was the Elector of Brandenburg who was surprised—in the other it was Hannibal who was ruined. But one was the end of the old; the other the beginning of the new. Great as was Nero's achievement, and momentous as were its results, it was but the culmination of a system which had been known and practised for years: it added nothing to existing principles of strategy. Nero simply applied with extraordinary ability the lessons which his countrymen had been learning for fourteen disastrous years, from the greatest master of the ancient world, perhaps of all time. Hannibal paid the penalty which even a genius must pay who continually makes war against the same enemy. In time his own methods and weapons are turned against him.

When the barbarian deluge swept away the arts and sciences war degenerated into mere personal prowess, and then slowly rose to a plane where pedantry and caution became the qualities most prized.

Turenne came upon the stage at a time when the science of war consisted in the choice of strong positions on the one hand, and various devices to compel their abandonment, on the other.

He recreated truly scientific warfare. He formulated and practiced the art of so directing and timing his marches as to increase the probability of victory for himself, and render defeat doubly disastrous for his enemies. Thus he regained the ground lost during the middle ages, and restored the apparently forgotten art of strategy. The service which he thus rendered his profession places him among the most important of its leaders. For while talent may work out any problem from known premises, it is the work of genius to found them.

The value of the new system became apparent as soon as Turenne had a field large enough to give it scope. In the duel

between Condé and himself in the civil war of the Fronde, victory had inclined alternately to one side. Much of the fighting had been done in and around Paris, where opportunities for strategy were few, and where Condé's energy and brilliancy of execution made him a formidable adversary. But when the theatre of war was enlarged Turenne's superiority manifested itself.

In 1683, with a force much inferior, he arrested Condé's progress on the banks of the Somme, prevented him from crossing, drove him back to Cambrai, and reduced him to practical inactivity during the remainder of the campaign.

The following year Condé, who was unequalled in the conduct of a siege, attempted to invest Arras. Turenne forced his lines and compelled him to raise the siege and retreat, leaving 3000 prisoners behind him.

In the spring of 1657 the situation was reversed. This time it was Turenne who blockaded Dunkirk. Condé and Don John of Austria marched to its relief. Turenne caught them among the sand-dunes which surrounded the town, as they were making a disposition for battle, utterly defeated them, and scattered their army in all directions. He then over-ran Flanders and carried his standards within two days' march of Brussels. On this occasion, Condé, disgusted at the turn affairs were taking, turned suddenly to the young Duke of Gloucester, the son of Charles I., who had volunteered for the purpose of gaining experience. "Did you ever see a battle won?" he asked abruptly, and when answered in the negative he added: "Well, in half an hour you will see one lost" — —. When Turenne confronted Montecuculi on the Rhine his manœuvres were so masterly that that able leader actually could not effect a passage of the river.

Turenne's vigilance never slumbered, and his combinations seemed to divine his opponent's plans and forestall his purposes. He was on occasion guilty of carelessness, as when he allowed Mercy to surprise and rout him at Marienthal in May, 1645. But he repaired this fault by such skilful retreat and speedy concentration of the shattered forces that he deserved equally with William of Orange the encomium of Louis XIV., "that his highness was more to be feared after a defeat than most generals would be after a victory." Inasmuch as he was less daring in battle than in his marches Turenne was the complement of Condé. A combination of the daring upon the field of battle which the one possessed, with the scientific strategy of the other

would have made a commander of the very highest type. But Nature rarely indulges in such prodigality. She rarely gives the creative and the analytical faculty in the same degree to the same artist: when she does so give it the result is a Shakespeare, or a Bonaparte.

Condé and Turenne did all that could be done with such tools as they possessed, battalions formed in deep rectangles and unable to deploy; for the pike was still needed to protect the musketeers, yet the pike without momentum was useless; cavalry confined to the wings to protect the flanks; no skirmishers to shroud with smoke changes of front, nor horsemen to interpose a curtain. Moreover, Vauban had not yet taught systematic methods of reducing fortresses, and as sieges were uncertain and of indefinite length, the fortress still retained much of the influence it had exerted in the days of Gustavus. Commanders regarded the campaign which resulted in the reduction of one as a masterpiece. In view of such limitations and restrictions the genius of Turenne shines out clearly. The work done by him not only constituted an epoch but advanced modern warfare to the point where the first man who fashioned an instrument fit for the purpose, must break out from the great circle which began with Alexander and ended with Marlborough, to lay the foundation of a new history and literature for war. That man was to be Frederick, but before approaching him we must glance briefly at the soldier whose misfortune it was to seem to follow when he deserved to lead, and to appear as the copyist of Turenne because that more fortunate genius had made originality with such means as were at hand possible.

It is difficult to estimate Marlborough's place among strategists on account of the peculiar conditions under which he held command. Calm, clear-sighted, and of exquisite tact, he was equally strong upon the field of battle, at the council, or in the exercise of that delicate diplomacy which was needed to keep together such an ill-assorted league as that of the Allies who undertook the task of humbling France.

He was past fifty when he assumed command of the allied forces, and although he had seen much service he had never held an independent command. Money and men were both voted grudgingly by the British parliament, £4,670,000, and 40,000 men was thought ample as England's contribution to a war in which France had 200,000 men under arms. Opposed to a



homogeneous army commanded by leaders responsible only to an autocrat who supported them in good fortune and bad, he commanded a patchwork army and was responsible, primarily, to a league which all his tact could barely keep from falling apart, and, secondarily, to a House of Commons in which one of two parties was his bitter enemy. Notwithstanding this all his battles were victories and none of his campaigns absolute defeats. His professional knowledge and his unerring judgment enabled him to detect the weak point in an enemy's strategy or tactics, while his courage was of that rare kind by virtue of which his mind never seemed so serene, his faculties never so active, as in the crisis of a battle. Circumstances destined him to employ a tactical ability never surpassed, hardly ever equalled, a rapid and unerring *coup d'ail*, and a mind capable of great strategic combinations in the service of powers who hampered every movement and brought to naught his finest conceptions. For this reason his career, while peculiarly interesting from the individual standpoint, exercised no marked influence upon the art of war.

After Turenne's time, for nearly half a century, military progress was arrested. No improvement in its higher branches could take place while the rigid formations remained. Until infantry could change front at the moment of attack its flanks remained vulnerable and cavalry was required to protect them. And these rigid formations must remain so long as the pike was needed to protect the musket. The answer to the problem which had hampered Turenne and Marlborough must be something which should make the musket self-protecting. The Swiss pike was the answer to the problem of how to enable infantry to resist cavalry: Vauban furnished the answer to this 18th century problem by the invention of the bayonet. Flexibility became possible and great results followed, for it is usually a tactical change which ushers in the epochs of war. Prussia which had but a short time before attained the dignity of a kingdom, furnished the instrument and the man.

A half-mad king, with a mania for collecting and drilling soldiers whom he never exposed to the hazards of battle, left to his son an army which was an admirable machine. The son, who had been bullied and imprisoned because he preferred French literature and a flute to military matters, changed the whole face of warfare, and made for himself a fame with which the world was still ringing, when a greater than he came upon the stage.

Frederick was essentially a tactican, and a tactician was what the art had grown to demand. The personification of his era, he accepted nothing upon the grounds of authority or tradition; he viewed everything from the standpoint of a clear, cynical intellect.

During his father's reign the old Prince of Anhalt Dessau, a firm believer in the ability of infantry to protect itself, had pushed his ideas to their logical conclusion. Under his system a perfection of drill was attained which had never before been dreamt of. Attained, it is true by the cane of the drill-sergeant, and to the utter misery of the unhappy beings whom the king's crimps seized from every country in Europe, but which enabled the Prussian infantry to march for miles in column at full distance, ready at any moment by a quarter-wheel, to form line. Frederick was not long in putting this mechanical toy to practical use.

He practised marching in two parallel columns so that he could form a double line of battle. He could thus manœuvre against the flanks of the Austrians, still in the massive formations of the preceding century, without fear of a counter-stroke. If they attempted to fall upon his flanking columns a rapid and simultaneous movement would convert them into lines with a front of fire greater than any which could be brought against them. This extension of one wing while keeping the other back and out of reach is the much discussed oblique attack, said to have been employed by Epaminondas at Leuctra. The secret of its success in Frederick's hands was the rapidity with which he could change front as compared to his foes.

He reduced cavalry from one-half to two-thirds the strength of the infantry but used it as no man had ever used it since the knight and the man-at-arms had fallen back before the pikeman and the musketeer. No leader ever exacted more from cavalry; no leader ever did more to prepare cavalry for such exactions. He insisted in retaining a boot-to-boot formation even when charging, and repeatedly said: "I will have no *mêlées*. If my men keep their ranks there can be no *mêlées*." His great cavalry chief, Seidlitz, succeeded in maintaining a rapid gait without losing this solid formation. A glimpse of his methods is obtained by the fact that in the cavalry barrack square the watering troughs were surrounded by iron railings which each trooper had to leap when his horse went to water. His remark to Frederick when the latter complained of the number of accidents at re-

views and sham engagements was: "Your majesty's wish is law, but I warn you, you must not expect in the future, such deeds of your cavalry as they have done in the past." The king told him to go ahead and break as many necks as were needed.

Frederick's successors seemed to ignore the fact that it was the immense superiority of his troops which made his method of attack seemingly irresistible. They took the form for the essence, and made of that method a fetich before which pedants worshipped. For two centuries before his time most battles had been fought on the wide plains of Belgium and Flanders. The theatre of his wars was generally rugged and often mountainous. In such a country he learned the paramount importance of infantry, and also how to so station and employ troops that each arm should derive the utmost advantage from the nature of the ground. His battles were masterpieces which could not be imitated with equal success; they depended so largely on the superiority of his troops. So long as his infantry possessed the exclusive ability to turn at any moment a flanking column into a line of battle, his opponents were unable to parry the blows which he varied as a swordsman does his assaults.

Briefly, then, we find that Alexander of Macedon was the first great tactician of history. In his hands the phalanx, with its massive formation and serried shields, its ability to face in any direction, and its consequent impregnability, solved for his time the problem of war.

Cæsar was a strategist merely by virtue of a profound and brilliant intellect, which estimated unerringly the value of the objective, and made both geography and human nature assist his schemes.

In Hannibal the military genius of the ancients culminated. Hardly inferior to Alexander in audacity and vigor he was unsurpassed in subtlety and invention by any man, ancient or modern. His strategic conceptions embraced Spain, Gaul, and Italy; and his objective like that of his modern prototype, was the sovereignty of the world.

Passing over the intervening centuries so prolific in achievements which were barren of result, we find Gustavus Adolphus completing the work of the English bow and the Swiss pike which had checked the hitherto irresistible rush of mailed chivalry. By restoring the lost prestige of infantry he gave the death-blow to a system which was incompatible with the true art of war. In

addition to this he materially advanced civilization by elevating the character and standing of the soldier.

Turenne revived strategy which seemed to have perished during the feudal period with its tumultuous battles and apotheosis of personal accomplishments.

Frederick released war from the restrictions which imperfect instruments had imposed, and after establishing a proper proportion between the different arms, left the commander free to dispose each to the best advantage.

Collectively, their individual genius had developed a *science of war*. Their successive efforts had assisted in moulding an instrument which was to be forged in the furnace of the French Revolution. For France, compelled to face enemies on every side, had to employ numerous detachments in the protection of her frontiers. And as these detachments were separated by distance, and sometimes by impassable obstacles, no single mind, however vigorous, could from hour to hour, direct their movements. Independent action requires that each arm shall be available, hence a new unit grew into being. Instead of an army made up of so many battalions, so many squadrons, and so many guns as the integer, as in the days of Frederick, the division of eight or ten thousand men, self-supporting with its own cavalry and its own artillery, became the basis of organization. Another feature, the skirmisher, was developed.

The French officers who had served in America during its revolution, had seen the disciplined battalions of England decimated and more than once worsted by men who, more or less under cover, fired individually and with deadly precision. They remembered these lessons and from Morgan's picturesque riflemen, with their coon-skin caps and their fringed tunics were evolved the redoubtable voltigeurs, the ideal skirmishers whose audacity and intelligence proclaimed them children of Paris and true offspring of the Revolution.

The first employment of the new system was feeble and desultory. For fear of being out-flanked armies moved on many parallel lines, actually inviting an enemy to break through this long and weak front, and early Revolutionary conceptions were so lacking in unity that even victories were lacking in substantial results.

The 18th century was preëminently a working time. It was more potent in demolition than in construction. Abuses were

dragged into view and decaying institutions pulled down; and from the resulting chaos was evolved that spirit of individual freedom which permitted a man to work out his own destiny.

Born upon an island whose civilization was about on a par with the France of Louis XI., Napoleon Bonaparte was projected upon this world heaving with the forces of unrest and revolution. Never before, since Philip of Macedon handed over to his successor a veteran army, an obedient kingdom, and an invincible organization, had a man appeared at the very moment when the instrument had been forged without which such deeds could not have been accomplished. It was one of those conjunctions of the man, the means, and the time, which produce the greatest work of which humanity is capable.

If in the days of his greatness Bonaparte loved to think of himself as the child of destiny, there was much excuse for such fanaticism. From his birth everything conspired to make his success meteoric. If he had been a Frenchman he would have inherited traditions from the age of formalism; some of the conventionalities which hampered the genius of Turenne and Marlborough would have clung to him. If the Revolution had not destroyed the privileges of birth he must have passed years in a subordinate position if indeed he could ever have emerged from it. If the republic had not been driven by her needs to adopt new methods the rigid drill of Frederick would have continued the model, and Bonaparte's genius would have had for an instrument a system fated to lose much of its efficacy as soon as its methods were studied, its perfections imitated.

As it was the Convention, by its absurd theories about the rights of man, had destroyed respect for authority, and reduced France to the verge of ruin. Frightened at the destruction it had wrought it confided the reorganization of the army to able men, and they by great levies utilized the enthusiasm of a people just awakened to the consciousness of their own power. Not having time to learn the Prussian system they improvised one which proved better suited to their circumstances. They covered their movements with a cloud of skirmishers and attacked in column where patriotic ardor could best compensate for the want of technical skill. They replaced an army in which the cavalry were almost entirely proprietary regiments, that is, raised and maintained by great noblemen who commanded and practically owned them, and the infantry was wretchedly paid,

systematically swindled, and only kept full by crimping, by an army which represented the hopes and aspirations of a new-born people.

The divisional system had formed bodies large enough for detached operations, and had equipped them with all that was required for independent action. The question was what use this student, this theorist, this adventurer would make of the new instrument with its latent and unsuspected possibilities. By much poring over maps, planning imaginary campaigns, and studying of the deeds of heroes he had acquired a comprehensive knowledge of the principles of his art. His first essay in 1796, was as much a masterpiece of that art as any of his subsequent operations. Here we find none of the usual signs of a novice in a profession where the successful practice generally depends upon experience. Difficulties imperfectly comprehended, opportunities not fully grasped, the fruits of victory lost from failure to realize what has been done. His plans were the result rather, of an exact estimate of the enemies' position. The Austrians in their efforts to hold a mountain chain seventy miles long, had widely extended their front. Bonaparte met this dispersion with concentration. Three divisions, pouring through the two central passes of the mountains split the Austro-Sardinian army, surrounded and destroyed one division, and rolled the divided wings back. Not a moment was then given the astonished foe in which to recover. Men fatigued by incessant marching were urged again and again to the attack until the Sardinian army sued for, and obtained, a separate peace; and the Austrians, dumfounded by the outrageous methods of this modern Alexander, withdrew their shattered forces to the Tyrol.

The other operations of '96, and the winter of '97, are brilliant variations of the same theme, concentration, but differently applied. And the possibilities of the divisional system are still further developed. It has always seemed to me that the operations of this eventful year, centring about Mantua, reveal the versatility of Bonaparte's genius in both strategy and tactics more fully than any except the incomparable campaign of 1814. From the labyrinth of fortresses, rivers and roads in Northern Italy, Napoleon selected the line of the Adige from Verona to Legnano. It was at once the easiest to defend and the best point from which to resist combined attacks. With that wonderful prescience which seemed to divine intuitively the schemes of



feebler intellects, he was convinced that the Austrians were not cured yet of their pedantic attachment to great turning and enveloping movements, and that the two routes around the Lake of Garda would prove an irresistible temptation to them. Secure in his strong position, he waited patiently until his enemies' plans were developed and their columns committed past extrication. Having the central position, and therefore shorter lines than his opponents he directed his marches in such a manner that he was generally superior at a particular point, and while maintaining the conflict there, could either prevent or retard Austrian progress at others. And herein lay the essence of his strategy. His weight was invariably thrown where victory was decisive. So unerringly did he estimate the relative value of events that although the reduction of Mantua was the main object of four successive campaigns, an objective to which he clung tenaciously in the face of several superior armies, yet he did not hesitate to raise its siege, to prevent a junction of opposing forces which might have overpowered him.

On the other hand when incessant marching and severe fighting had so depleted his ranks and exhausted his men that they seemed no longer capable of the rapid marches by which they had multiplied themselves, when after the battle of Caliano the enemy pressed so close that there seemed no possible room for strategy and even the desperate attempt to break through the lines at Caldiero was repulsed, this indomitable genius seized the only chance left to him and transferred the war to the dikes and marshes of Arcola, where numbers availed less, and the issue depended upon the courage and constancy of the columns. Hurling back again and again, he appealed to the fierce patriotism of his men, imbued them with something of his own spirit, and threw himself into their ranks to conquer or to die with them. Thus, at one stroke he regained all that he had lost, and finally crowned this wonderful year with a final prodigy of tactics, Rivoli, where 30,000 men took 20,000 prisoners.

The year 1800 brought forth plans grander in scope as the political horizon widened before the young conqueror.

In that year the Austrians occupied his own strong ground of 1796. Rejecting all other advances because the completest success would but force them back upon their own lines of communication, he emulated the great master of antiquity, descended from

the Alps, turned the great quadrilateral of fortresses, and planted an army so squarely across their communications that nothing was left them but to break through or surrender. It was one of those strokes by which kingdoms are won, and from Marengo the path ran straight to the Tuileries. And it will not do to say that he had no business to run such risks, and that an earlier concentration by the Austrians might have cut him off. He emulated Hannibal in more than merely crossing the Alps. He provided a bait in the garrison of Genoa, and sacrificed Masséna, not wantonly but remorselessly, that that very concentration might not take place.

Ulm and Austerlitz mark the full development of the Napoleonic genius. The division had become too small an instrument for combinations which embraced the great triangle between the Rhine and the Danube, consequently the corps—containing from 20,000 to 35,000 men—was made the basis of independent action. A mountain pass or a forest could no longer mask movements of increased magnitude, and the heads of the great columns which were spread along a front of 170 miles were cloaked with light cavalry to bewilder the Austrians as to their real destination.

No one appreciated like Bonaparte the two great elements of warfare, time and place.

In this campaign, by a wise selection of his base of operations, the flank-march—that two-edged sword which had so often fatally wounded the ordinary mortals who had tried to employ it—became in his hands a more potent weapon than it had been even in Frederick's, its exemplar. For the Prussian king had depended upon the superior mobility of his troops: Bonaparte depended upon an inherent advantage of which he could not be deprived, and which gave him a practicable retreat in case his combinations failed. They did not fail. So perfectly were his marches timed that his columns crossed the Austrian communications with just sufficient interval to clear each other till the master-hand saw fit to draw the meshes of the mighty net—and another Austrian army laid down its arms.

As the strategy of 1796 had ended with the tactical prodigy, Rivoli, so the grander operations of 1805 ended with Austerlitz, a battle worthy to rank with Marathon and Cannæ, a battle which dissolved a coalition and laid an empire at Bonaparte's feet. This seemed for a time the culminating point in the Napoleonic system, and if his fame had rested there Hannibal alone of all the soldiers of the world could challenge him.

What of his faults. That he committed some is only to say that for many years he made war, for in war he is the greatest general who makes the fewest. But his worst errors were due to his double rôle of soldier and emperor. His political generalizations were not always sound. Hence he did things which his own military sense must have disapproved rather than yield some conquest or relinquish some gigantic project. The utterly unjustifiable occupation of Spain was his first, as perhaps it was the greatest of such errors. It entailed consequences which marred his subsequent plans, and neutralized many of the results of Austerlitz. If, in 1812 and 1813 he adopted methods which seemed a falling off from the days of Rivoli and Ulm, and appeared to trust more to masses than to combinations, it was because the whirlpool of Spanish wars had swallowed up the unrivalled divisions that had carried the heights of Pratzen. His veterans having been squandered against ferocious patriotism, he had to resort to deep formations in order to inspire confidence in conscripts.

In his Russian campaign he evinced the same great mind which had planned Ulm and achieved Austerlitz. But the objective of this campaign rested upon a false assumption, that the loss of one great battle and the capture of the capital would end the war, and so the fruits of victory turned to apples of Sodom in his possession.

In his great retreat it is not true that he was apathetic, or failed to appreciate and provide against disaster. The subject of subsistence, neglect of which has been charged against him, had been worked out with a thoroughness in proportion to the undertaking, and had he carried out his own idea of the line of retreat, his prescience would have been praised to the present day. Meeting with violent opposition from his marshals, he simply did not dare to enforce his own views upon the subject. His petty jealousy had discouraged all exhibition of original ability, as though it trenches upon his special province, had belittled Davout's magnificent feat at Auerstadt and carped at Moreau's victory at Hohenlinden. But for this he might in these sore straits have taken his generals into his plans, confident of their sympathy and coöperation. If he had not substituted the lower ideal of personal glory for the higher one of love of country, he could, at this time, have called upon them for the last sacrifices which men lay upon the altar of patriotism. The difference in the way in

which Greene served Washington, and the manner in which his most trusted marshals served him in his time of need, measures the difference between the two standards. The stream cannot rise higher than its source. He had made himself their all. They looked to him and not to France for everything, and when he abandoned his comrades amid the snows of Lithuania, to forestall criticism in Paris, who can wonder that they faltered when he had no more crowns or batôns to bestow.

His failure to withdraw the great garrisons of the fortresses of the north when he entered upon the desperate struggle of 1814, was another political error. He wished to let nothing go, hoping by one great battle to regain everything. His rejection of the sincere mediation of Austria after his victory at Dresden, rather than relinquish the meaningless "Protectorate of the "Rhine" was such madness as overtook the ancient king of whom it was said, "God hardened Pharaoh's heart that he would not let the people go."

But it seemed as though Fate had decreed that even his errors should enhance the fame of this extraordinary man. When their inevitable result came, he struggled against the Nemesis which had overtaken him, with such marvellous resources that the operations of 1814 will probably for all future time constitute the most profound and complex problem in the art of war. With the exception of the Austrian Archduke Charles, he had hitherto spent his genius largely against opponents checked and hampered by councils and pedants groping among the remains of dead systems. In the campaign of 1814 he showed what he could effect against overpowering numbers, when the prestige of unvarying success had been lost, and the laggards and theorists of other days had been superseded by men who had begun to fathom some part of his own system.

The beginning of the year 1814 found two great columns of the enemy advancing along the Seine and the Marne. These rivers, after running nearly parallel for seventy miles, converge as they approach Paris and unite a short distance from the city. The Austrians, 116,000 strong, were on the Seine. Blucher, with 88,000 Prussians and Russians was on the Marne. Bonaparte had 87,000 men with which to oppose more than 200,000, and Schwartzemberg, the pupil of the Archduke Charles, and Blucher a worthy successor of Seidlitz, were men of very different calibre from old Beaulieu and Alvinzi and Mack. No higher exempli-

fication of the strategist's art was ever given than the manner in which Bonaparte seized the opportunity to repeat the lessons of Lodi and Rivoli—the single line against combined attacks, upon ground so skilfully chosen that his comparatively small force seemed trebled. Every bridge which spanned either river became a vantage ground. By holding it he could with one wing keep back for the time greatly superior numbers while the other wing took the aggressive. Meanwhile, Bonaparte in the centre, by means of the many practicable roads which ran from stream to stream could throw his whole force where the attack was to be. The wing thus heavily reinforced became nearly as strong as the enemy, and the French, accustomed for years to conquer, thought nothing of such odds when fighting for home and country under the eye of one who, if he had forfeited the favors of fortune, had not yet ceased to be their idol. Thus Bonaparte fell upon Blucher at Champ-Aubert, at Montmirail, at Chateau Thierry, took 20,000 prisoners and killed 10,000 with but little loss. While the Prussians were staggering under these successive blows Bonaparte had reinforced the other wing and fallen upon the Austrians at Naugis and Montereau. He struck thus on one side and retarded on the other alternately, and at one time Blucher was in imminent danger of losing his army till the cowardly surrender of Soissons by a subordinate opened a door of escape to him. Notwithstanding this *contretemps* had the course of the rivers continued parallel it is probable that the time would have come when repeated defeat must have forced the Allies to abandon the movement upon Paris. But as the rivers converged and the space between them narrowed Bonaparte's best efforts could no longer keep the hostile armies apart. The theatre of his wonderful combinations became a vise which threatened to crush him. Massing every available man he made a last desperate effort, and when that failed he fell back upon the fortresses of the north in a vain quest for the hundred thousand veterans who at the beginning of the campaign might have saved his throne.

It is manifestly impossible to decide the relative merits of each of these great masters of the art of war. The fame of some of them has come to us from times so remote that it remains as a mere inscription traced upon the monument of the ages. Others of later date, have rendered such services to their profession, that the individual can with difficulty be separated from the conditions which moulded or marred his talents.

From among them all two men must ever stand alone, Hannibal, the greatest soldier of the ancient world, a type of the loftiest patriotism, who fell before the advance of a nobler civilization; and Bonaparte, whose transcendent abilities were spent in an ineffectual attempt to conquer the world! They stand preëminent by virtue of the highest gifts in fittest proportion which have yet been given to warriors, distinguished by the breadth and scope of their aspirations and the measure of the success which they attained—united, in spite of the centuries which separate them, by the colossal proportions of the disasters which finally befell them.



## Reprints and Translations.

### FORMATIONS AND BATTLE METHODS OF FOREIGN INFANTRIES.

Translated from the *Revue de l'Artillerie*.

By FREDERIC R. COUDERT, JR., 2d Lieut. Squadron A, New York.

#### PREFACE.

INFANTRY battle formations do not permit of any regular "scheme" or normal arrangement: the constantly increasing efficiency of fire-arms renders it necessary for the assailant to take advantage of every means of shelter, and to make his dispositions conform to the nature of the ground. Even where the ground is quite open, the variable elements which come into play in a battle (the steadiness of the troops, the intensity of the enemy's fire, etc.) are opposed to the employment of a "normal method" of attack. But if the dispositions of troops for battle cannot be made according to any precise regulations there nevertheless exist certain fundamental principles for deployment and echeloning as well as for the employment of infantry fire.

The regulations, even those which have the least tendency to be formal, and in which the fixed plan or scheme is denounced as a serious danger, cannot escape the necessity of formulating these principles, and of giving certain general indications.

The object of the present article is to find in the regulations of the main European powers these general characteristics. They are found to be almost the same among the different nations, with slight modifications and changes due to particular tendencies and national character. To the study of these regulations, we will add as much as possible, in order to better understand their spirit, an examination of the formations, and methods of combat employed in the grand manœuvres.

#### GERMANY.—ELEMENTS OF FORMATIONS.

Before beginning the study of infantry battle tactics, it may be useful to give certain particulars as to the position of the units, as well as their order of march and of assembly.

*Organic formations.*—The tactical unit is the battalion, which upon a war footing is composed of 1000 men.

The battalion contains 4 companies.

The company contains 3 platoons, each of them commanded by a lieutenant; each platoon is divided into 2 half platoons, and each half platoon in its turn into sections of from 4 to 6 files.

The brigade as a rule is composed of 2 regiments, and the regiment which in time of peace is composed of 3 full battalions and a half battalion, is mobilized at 4 battalions.

*Formations of the company (a) in line.*—The company is formed in line in two ranks, the distance between them (measured from the knapsack of the man of the first rank to the chest of the man of the second rank) is 64c. Each man occupies in rank the space of 80c.

(b) *In column.*—The column of sections is the normal formation for the march. It allows open intervals in the ranks and the increase of the distance between the two ranks. This distance is 1m. 10. When the sections contain 4 files the column has a length of about 100 metres.

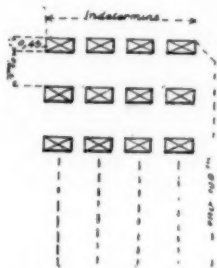


Fig. 1. — Colonne de sections ( $\frac{1}{300}$ )

Whenever it is desirable to diminish the depth of the columns the infantry can march in columns of half platoons, or even of platoons if the ground permits it.

*The company column* is composed of 3 platoons placed one behind the other at a distance of 7 paces between the ranks; the distance between each rank in each platoon is the same as in line formation. This is the essential formation for assembling and manœuvring.

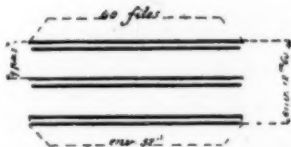


Fig. 2(2). — Colonne de compagnie ( $\frac{1}{1000}$ ).

*The column of company by half platoons* at  $3\frac{1}{2}$  paces distance is equally of very frequent employment; for a company upon a war footing it presents a front about equal to its depth, and thus adapts itself better than the column of company to the preparatory movements on the field of battle.

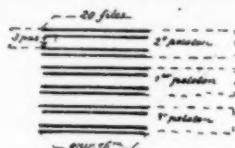


Fig 3. — Colonne de compagnie  
par demi-peloton ( $\frac{1}{1000}$ ).

*Battle formations.*—These formations comprise *double column*, *deep column*, and *large column*.

(1) *Double column* is a formation for assembly and march applicable only while the battalion is out of range of the enemy's fire.

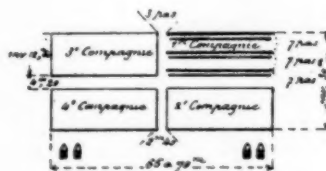


Fig. 4. — Colonne double ( $\frac{1}{1000}$ ).

(2) *Close column* is constituted by the 4 companies, placed one behind the other at a distance of 7 paces. It is used for marching or assembly formations on a narrow front and is particularly valuable as an intermediary between the road column and battle formations as long as the battalion is out of range.

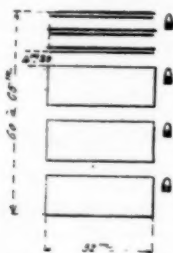


Fig 5 — Colonne pro-  
fonde ( $\frac{1}{1000}$ )

(3) *The large column* is nothing but a line of company columns. This is the formation in which the battalion is assembled after a battle unless otherwise ordered.

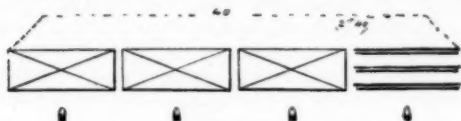


Fig. 6. — Colonne large ( $\frac{1}{2000}$ )

*Length of different steps and time of each is as follows :*

- (1) *The ordinary step* length 80c., time 114 to the minute.
- (2) *The attacking step* 120 steps to the minute.
- (3) *The gymnastic step* length 1m., time 165 to 175 to the minute.

Lastly the *run* employed at certain times by skirmishers and at the final charge.

#### OFFENSIVE COMBAT.—GERMAN REGULATIONS.

It is necessary when speaking of the German regulations to note the fact that their main characteristic consists in the absence of fixed rules, and the formal prohibition to add to the regulations more precise, and minute indications which might be of a nature to hamper subordinates.

*General distribution of troops.*—The infantry regulations upon this subject give the following indications: "The respective force of the respective echelons cannot be fixed by any general rule. In principle however the fraction first called upon to engage will be as feeble as possible, while on the other hand the fraction held in reserve will be as strong as possible; in general not more than a quarter of the force at most should be employed and at least a quarter should be held in reserve. Nevertheless that is a mere theoretical principle which must not be allowed to interfere with the tactical units or loosen the bonds which unite them."

Thus every unit fighting singly is divided into 3 echelons. The battalions of the second and third line remain in column until called upon to attack. Nevertheless they may in the course of their advance find it necessary to traverse a zone beaten by the enemy's artillery, in which case they are forced to deploy, at least during the time necessary for passing through such zone.

#### DEPLOYMENT OF THE BATTALION.

Let us examine the successive formations which the battalion in the first line of battle will be forced to take from the instant the regiment having left its marching formation, receives the order to deploy, and how this deployment should be effected.

The formations which will habitually serve as intermediary between the marching column and the double formations are "close column" and "large column" but we must remember that this is in no wise obligatory. The commander of the battalion according to circumstances, and with particular regard to the rôle which has been assigned to the battalion in the plan of battle, must determine the distribution of his forces; in particular he should keep in reserve at least one company, and should give to the first deployment more depth than breadth. He should proceed progressively and as occasion requires to reinforce the first line.

The distances and intervals between the companies are fixed by the commander of the battalion; the captains regulate the further deployment of the companies as skirmishers and the direction of their fire.

The captain deploys his company in accordance with the same principle as the commander of the battalion, *i. e.*, increasing the force of his first line as occasion requires, and this generally by entire platoons. In the beginning he deploys as skirmishers at least one platoon and retains from one to two platoons as supports.

The regulations in regard to the subject of the "chain" or skirmish line are as follows:

*Chain.*—The skirmishers generally take an interval of one to two paces, unless a greater interval is necessary, in which case a special order to that effect is given.

The chain is composed of a certain number of groups corresponding to sections and commanded by a non-commissioned officer. The intervals between the groups vary according to the inequalities of the ground and the circumstances of the fight. Between the two platoons thus deployed there should be an interval of about seven paces. The density of the line of skirmishers in the different platoons may if the necessities of the battle require it be increased so that the men are elbow to elbow.

The battle front of a company should never exceed, under ordinary circumstances, 100 metres; that of a battalion 2 to 300 metres, and that of a brigade 1000 to 1200 metres. This latter number is given as a result of the experience derived from the Franco-German War of 1870-71.

*Supports.*—Behind the line of skirmishers come the different units, in close order, destined to reinforce and sustain the skirmishers. Each of these units is made up of the remaining platoons of the company; they are formed in line or in column, and their distance from the chain of skirmishers results from the shelter afforded by the ground and the possibility of best fulfilling, at the proper moment, their rôle of reinforcements and supports which belongs to them; this distance should be at least 200 metres on open ground in order that the bursting of a shrapnel may not reach at the same time two successive echelons.

We will now glance at the exact method in which the battalion, once deployed, conducts its advance, and how its disposition and distribution must be modified in proportion as it comes within the successive zones of the battle-field, and in a word, in accordance with what principles the firing and the final attack will be executed.

#### CONDUCT OF THE BATTALION IN BATTLE.

*The Chain.*—If the ground presents some shelter the chain advances as rapidly as possible within effective range of the enemy's position without firing. On the even and open ground, if sufficient preparation for the attack has not already been made by the artillery, it may be necessary for the battalion to open fire at the medium ranges (from 600 to 1000 metres) and then to proceed by successive rushes, executed alternately by the fractions of the chain; those at the halt protecting by their fire the forward movement of those marching. Nevertheless, the advance by successive rushes must not

be considered as a normal and regular method but rather as an alternative, which may be used within narrow limits and when the enemy's fire obliges the skirmish line to halt. Therefore, this method of progression by rushes must not be commenced at a great distance from the enemy, nor must the rushes be very short, nor should the halts in the successive positions be long. The desideratum is to advance almost without stopping, under the protection of skirmishers placed laterally or in positions dominating the enemy.

*Supports and Reserves.*—As long as the decisive moment has not arrived, it is necessary above all things to protect from the effect of the enemy's fire the detachments, in close order, remaining in the rear of the skirmish line. If the ground presents no shelter, it is necessary to maintain these detachments at some distance. In case of absolute necessity, they may, it is true, form in extended order for the purpose of passing over a zone beaten by the enemy's bullets, but they must reform in close order as soon as possible. The latter is an essential condition in order that they may remain sufficiently under the control of their officers and be capable of giving to the first line the impulse which will be necessary for its final success.

In proportion as the decisive moment approaches, and as the firing of the defense becomes feebler, the depth of the formation should diminish in order that the disposable troops may find themselves near at hand at the desired moment. The supports must conform as much as the nature of the ground permits to the movements of the chain; approaching it as much as possible and reinforcing it according to circumstances, either in prolonging it on each flank, or in filling up gaps. Supports and reserves execute their march in this last phase of the combat deployed in line in close order.

#### THE PREPARATORY FIRE, AND THE ATTACK.

Whatever may be the circumstances, it is only at the shorter ranges (600 metres and under) that the real preparatory fire is to be executed; once within this decisive distance, and reinforced by the fractions in the rear, the chain executes a fire of great intensity, upon which will depend in reality the issue of the combat. When this fire is considered by the commander of the attacking troops to have produced sufficient effect, he gives the signal for the assault. The regulations do not furnish any precise indication as to the maximum distance at which the bayonet charge should commence, but they insist upon essential conditions for the success of this attack, which are as follows:

A preponderating advantage on the part of the assailant, obtained by the preparatory fire;

The prompt utilization of the favorable moment;

And, finally, the indomitable force of will requisite for its execution.

"If the assailant hesitates and halts to fire, experience teaches us that the attack is condemned to failure, and that it cannot succeed unless new troops are brought up to carry it on and finally to storm the position."

At the moment when the order for the assault is given the detachments in close order, still in rear of the chain, move rapidly forward, with drums beating,—to the cry of Hurrah!—in order to join the chain and with it



storm the enemy's position. The relative situations of the echelons, and their formation, at this moment result entirely from circumstances. The whole question now is to move forward with great energy and uninterrupted rapidity; one single impulse must move the whole mass, but it is necessary, before giving this impulse to the chain, to remember that it costs less to destroy the enemy by fire at the last halting place than to attempt to break them by shock.

If the officer in command has made the proper and logical usage of all the forces which he has under his control, if he has allowed them to produce successively every effect of which they are capable, the enemy will be already crushed at the moment when the assault is ordered; it will only remain to hoist the flag upon the conquered position. If on the other hand he has not known how to wait, he will only cause his troops to be sacrificed upon the enemy's front, and will no longer have a sufficient force to compass the last effort.

Such is in its entirety the conduct of the attacking infantry, as far as it can be deduced from the rules laid down in the infantry regulations. Without doubt things will not always move with such precision and regularity. Frequently it will be necessary to gain ground, so to speak, inch by inch, and the regulations provide for the case where "the assailant may find it necessary to have recourse to entrenchment tools in order to hold the ground already won"; but in a general way the rapidity of the attack and the suddenness of the deployment are among the principal factors of success.

#### OBSERVATIONS RELATIVE TO THE EMPLOYMENT OF FIRINGS.

We have seen that although it was the express intention of the authors of the German Regulations not to lay down any fixed rules, which would tend to institute a normal or regular battle method, it is nevertheless, possible to deduce from the foregoing, certain well-defined principles as regards the employment of fire. In part these principles are as follows:

(a) Shock action is entirely subordinated to the preliminary fire action, which latter is everything, and the charge is, so to speak, a final act which only confirms the success already obtained by the fire.

(b) "Good infantry ought to be able to remain exposed to the fire of the enemy without reply if it is apparent that its own fire cannot have adequate effect." It must, therefore, wait until it has arrived within proper range and then it must give to its fire all possible intensity—this latter to be obtained rather by the number of skirmishers who participate than by the rapidity of their fire.

The Germans have very little confidence in long range firing—that is to say, beyond a thousand metres—the effect of which they consider as generally out of all proportion (except when executed upon objects of great extent—high, large and deep) to the quantity of ammunition consumed. They attribute a preponderating importance to the individual firing, and restrict on the other hand to narrow limits volley-firing. The zone of the former does not extend beyond 600 yards. "Nothing can be expected from individual firing, even from the best shots, when they are executed at more than 600 metres against objects which are not of very large dimension and whose

distance is not exactly known. Beyond 600 metres, the firings are executed by platoon or company. Good results may be expected from firings executed in these conditions at medium distances (600 to 1000 yards) provided the objects are sufficiently large." But in a word, the employment of volley firing is held in small esteem in Germany, for example, Captain Maerker, Professor at the War College of Dantzig, says: "The French attach to long range firing much more importance than we do. This comes especially from their predilection for volley firing, the high efficiency of which an energetic adversary may greatly compromise once he has come within the medium ranges, if indeed he is not able to render it altogether impossible.

"Now in a majority of cases it is not at the long ranges that it will be prudent or possible to obtain the superiority resulting from the preparatory fire; but even at the medium ranges, and still more at the short ranges, the volley does not seem to be the appropriate method for a system which depends upon the efficiency of fire for its results. Therefore after having been held in high esteem in Germany at the end of the last century, it is with good reasons and because of just considerations that volley firing has been relegated to a secondary position, and that we Germans have attributed a very much greater importance to skirmish fire.

"In a combat against an adversary employing principally volley firing, whether this adversary be the Russians or the French, or both together, for us the dominating idea must be to traverse with the greatest possible speed the zone of the long range firing and to come within that of the medium and short ranges."

*The Different Formations Taken Under Fire.*—In order to note all the principles relative to infantry formations furnished by the present regulations, it is necessary to advert to certain indications contained in the "Regulations as to Field Service," of the 20th July, 1894, and notably to the article relative to the Grand Manœuvres. These indications are designed to enlighten the arbitrators concerning the distances within which the units of the different arms are no longer able to move or remain stationary in certain formations under the fire of infantry or artillery. Here are the precepts laid down:

*First, as opposed to artillery:* Once within 2000 metres, infantry companies in close order cannot remain exposed without shelter to the firing of hostile artillery unless the latter be effectively counterbalanced by their own artillery. Between 1500 and 2000 metres, artillery firing is very efficient when directed against troops in close order unsheltered. In this situation, if the ground offers no cover, infantry can only move in line, and must either advance or retreat.

*Second, when opposed to hostile infantry at* from 800 to 1000 metres, on open ground and exposed to a well-sustained and carefully directed fire infantry units in close order are unable to execute flank movements, or to halt even during a short time, unless the fire of their own skirmishers dominates, to a certain extent at least, the fire of the adversary. Within 800 metres, and in analogous conditions, troops in close order, even when protected by strong chains of skirmishers, are unable to risk themselves,

except when moving forward or retreating. Once within the smaller distances, from 400 metres on, a chain of skirmishers unsheltered cannot halt except for a very short time; the fire of either side at this distance being quickly decisive; in consequence, it either must move forward to the bayonet charge, or one of the two parties must fall back.

*The Grand Manœuvres.*—In the preceding summary it was attempted to present the main principles contained in the regulations now in force. As a consequence of this exposition it may be of interest to reproduce some pages from an article recently published relative to the German "Grand Manœuvres." In the article in question, the English Colonel Turner in relating the method of attack actually employed by the German infantry, states:

"Time after time I was present at an operation of this kind and I invariably saw it carried on in the same way, despite the absence of precise rules and regulations on the subject.

*"An attack executed upon a position by a German division of twelve battalions.*—The divisional cavalry is deployed on the front of the division and is opposite the enemy, who is firmly fixed in a defensive position. This cavalry reconnoitres as far as possible upon the front and flanks of the enemy; after having received the requisite information as regards the position and force of the enemy, the general commanding the division determines to attack. The cavalry faces about and places itself in rear of one of the flanks of the division. The general, in order to protect his deployment and to dominate the artillery of the enemy, sends all his batteries to a position distant some twenty-five hundred yards from the adversary, and the artillery duel then opens. As soon as the fire of the enemy is sensibly weakened the batteries are pushed up to within eighteen hundred yards of his position, and from this short, decisive range the artillery of the defense is almost or entirely reduced to silence. Until this result is attained it is considered that an infantry attack upon the enemy's front has little chance of success. This artillery duel is a long affair and may last two or three hours, but in the manœuvres it seldom exceeds one hour. During this period the infantry approaches in the following formation:

"First. The first line contains the firing line in one rank, with intervals of one or two paces, which moves upon the designated point of attack.

"Second. The supports, also in one line, following at two hundred and fifty yards.

"Third. The reserves at about an equal distance and in a formation appropriate to the ground and the circumstances.

"Firing is not seriously begun until the firing line has arrived at about one thousand yards from the position; there it makes a short halt, the supports join it and reinforce it, the reserves diminish their distance and deploy. The firing line thus reinforced moves rapidly forward by a united and continuous movement and does not halt until five hundred yards from the enemy. There the reserves take their place in the firing line, which becomes very compact, and executes for several moments a fire at will, very rapid and sustained. This line really appears very dense, but we must not forget that at the manœuvres no gaps are produced in the line, as hap-

pens in war. During this time the rest of the division, except a small reserve which the general keeps under his hand, advances in one rank by company, with drums beating and fifes playing. These companies move independently, and the whole country seems to be covered with them. They all approach slowly but surely upon the point of attack, until they are disposed in a sort of formation in several lines just opposite the object of attack. The firing line, followed by the rest of the troops then advances rapidly until within three hundred yards of the enemy where it opens a terrible fire. The mass in the rear now takes its place in the firing line, and of a sudden one of these companies, followed by the rest rushes forward and in one minute a terrible tempest, without apparent formation, or order breaks upon the enemy.

\* \* \* \* \*

"The Germans do not believe in firing at long ranges. Their cannon and rifles actually carry very far, but after all it is the power of vision of the man which must ultimately fix the limits of range. Firing at long distance can produce little effect, while at the same time consuming an enormous quantity of ammunition. They do not tarry, once the attack is begun, under the shelters which the ground may afford, it is their desire above all things to approach as rapidly as possible to the enemy, and to decide at short range the issue of the battle."

Although the foregoing account seems rather to err in the excess of precision and the regularity and formality of the methods of attack noted by Colonel Turner, which appear somewhat in opposition to the spirit of the German regulations; nevertheless, certain points of his account call for particular attention. He says, "And first, a short halt, corresponding to the opening of fire, takes place at about 900 yards from the enemy's position. There the supports come to reinforce the firing line and join it." Thus the suppression of the supports prescribed in the new French regulations finds equal application in the German infantry, at least from the moment at which they arrive within the medium ranges. This fact, which does not seem to accord with the prescriptions of the regulations, is confirmed by a recent article in the *Rousskii Invalid*. The rapidity with which the attacking infantry moves, the small number of positions which it successively occupies to fire from and the almost absolute exclusion of long range and even medium range firing, all recommend it, and if not prescribed by the regulations, it is found put into practice according to the account of Colonel Turner.

The author of the article just cited in the *Rousskii Invalid* also says on this subject: "The chain of skirmishers advances generally in long lines, without stopping, and if necessary at the double time; so that it does not occupy during the whole duration of the combat more than two or three positions well adapted for firing. It is true that the regulations permit moving forward by successive rushes, but in practice the Prussian infantry never proceeds in this way except in very exceptional cases, when it is impossible to do otherwise; as, for instance, in an absolutely open country and in face of a very violent fire from opposing infantry." Finally the employment of the line in close order for the reserves, even some

time before the last phase of the battle, appears to be practiced in the manœuvres rather more exclusively than the indications furnished by the regulations would seem to warrant. This would seem to appear from an article in the "Proceedings," and from that just cited in the *Rousskii Invalid*, as well as from an article in the *Post* relative to the Grand Manœuvres. A passage in this article deserves to be noted for other reasons in that it furnishes an extremely characteristic example of the actual battle methods of the German infantry. "The division," it is there said, "moves forward preceded by its regiments of divisional cavalry whose function is to reconnoitre the ground and protect the flanks of the advancing infantry. This forward movement is made by brigades marching side by side. In the interval of two hundred to three hundred metres which separates the two brigades appears the divisional artillery, the ammunition wagons and the ambulances. Each brigade is preceded by a battalion in battalion column; behind comes the mass of the brigade with its two regiments in deep order. In each regiment four battalions advance in line of battalion columns. This whole mass marches across the fields towards the designated object; as soon as the brigades come within efficient range of the enemy's infantry, the intervals and distances are increased; the leading battalions form first in line of company column and then take their formation for attack. The battalions in the rear follow the deployed line. As soon as the preparatory artillery fire has been judged sufficient, the skirmish chain is moved forward; it attempts to reach the enemy by a succession of rushes. When the enemy is finally shaken the infantry fixes bayonets, drums beat, regimental bands play; the whole line rushes forward, the bodies of troops kept in reserve remain in deployed line, ready to push forward the chain of skirmishers or to furnish a rallying point in case of a check."

#### DEFENSIVE.

No method of combat depends more absolutely and directly upon the nature and character of the ground than the defensive; therefore in this case, less than ever, is there any possibility of a normal or regular disposition. The distribution of troops and their echeloning are effected, in a general way, in accordance with the same principles as govern offensive action. As soon as the general direction which the attack will take is perceived, the distance between the echelons is reduced and the firing line reinforced. The main consideration for the defense is a most thorough and complete utilization of all its firing power, and upon that depends its choice of position and the nature of the field-works to be erected.

Considering the effect of modern weapons, field-works have acquired a capital importance, and it is very essential that they should not be undertaken prematurely lest the liberty of action of the troops be interfered with. Erected at the right moment and in a proper place, these works are susceptible of rendering very important service and are at times indispensable.

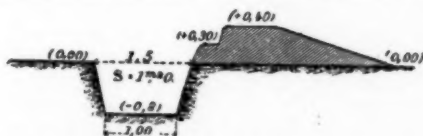
At the same time that the shelter trenches and other means of protection are in process of construction, it is of the greatest importance to clear the ground over which the firing will take place. The German infantry, when the ground has thus been cleared and it is in a position to

completely utilize the effect of its fire, is, according to the regulations "capable, thanks to its careful instruction in rifle practice, of stopping every front attack. The assailant will suffer such enormous loss, that, terribly shaken, after his first check, he will find it very difficult indeed to renew the attack."

The infantry places itself as far as possible at a safe distance in front of the artillery, to assure to the latter efficient protection against the enemy's infantry fire, and on the other hand to protect itself from the effects of the inevitable artillery duel. Therefore, leaving to the artillery the more elevated position the infantry establishes itself upon the slopes and sides of the position. It must avoid the immediate vicinity of villages and woods, as these form such excellent objectives for the enemy's fire; and it should construct trenches some distance to the front, while the reserves should place themselves some distance in the rear.

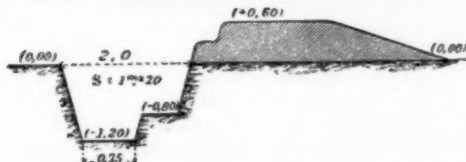
The erection of obstacles beyond the front for the purpose of obstructing the enemy's attack is only proper when the position is such that the adversary may come upon it without moving over open ground; or, in other words, when the ground is such that the enemy can approach nearly all the way under shelter. In erecting these obstacles, it must also be taken care that they should not be of a nature or character to hinder, in any measure, the free action of the defensive, which "ought always to be ready to take up the offensive if occasion requires, and if it is desired to obtain positive results."

Without, therefore, insisting further upon the general principles which serve to guide the German infantry in defensive combat, we will limit our-



selves to indicating generally the nature of the field-works which it will be called upon to execute.

The first condition essential to field intrenchments is that they should constitute a shelter capable of being constructed in the shortest possible time, and whose conformation is such that it is very easily strengthened. These conditions are realized by a trench designed for firing kneeling.



The length of ridge necessary for the skirmishers of a company is according to the size of the company from 120 to 250 metres—that is, counting one yard for each skirmisher. The length of time required to construct such a



trench in employing all the men in the company furnished with intrenchment tools, varies from half an hour to an hour and a half, according to the nature of the soil.

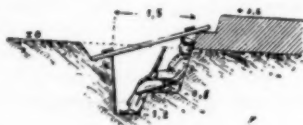
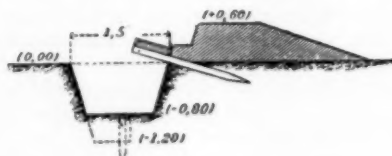


Fig. 8a.

The trench for firing standing may be made by simply raising the above-mentioned trench. Its construction requires three-quarters of an hour to three hours.

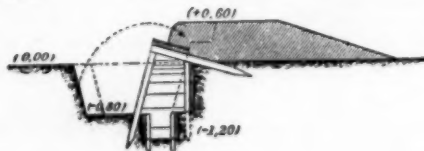
By a still further strengthening, we obtain the so-called reinforced shelter trench, whose construction requires two hours to five hours and a half.

Finally, it is possible to have other works of a more important and extensive nature if it be necessary to hold the position for some length of time.



Every possible precaution is taken to render the parapets of the trenches as little visible as possible; for that purpose it is sometimes desirable to erect at some distance to the front mere dummy works or trenches designed to deceive the enemy as to the position of the real works.

It is also most useful to increase the protection offered to infantry by trenches, in establishing with the materials at hand light sheetings capable of stopping shrapnel shells, or protecting the men from the results of explosive projectiles.



The rôle of infantry firing on the defensive does not in fact commence until the assailant has arrived within effective range; it is therefore important for the infantry thus condemned to remain almost inactive during the artillery conflict not to be exposed to useless loss and consequent demoralization.

The following table indicates according to the German regulations the

thickness of the parapets and sheeting capable of resisting the different projectiles :

*Against Rifle Bullets :—*

Sand.....	75 cm.
Ordinary soil.....	1 m.
Turf .....	2 m.
Packed snow .....	2 m.
Packed straw.....	5 m.
Oak wood .....	60 cm.
Pine wood .....	1 m.
Brick masonry.....	50 cm.
Steel plates .....	2 cm.
Two thicknesses of planks filled in with pebbles....	20 cm.

*Against Artillery :—*

EXPLOSIONS OF SHRAPNEL OR SHELL.

	Field artillery.	Heavy artillery.
Earth .....	40 cm. to 1 m.	1 m.
Wood employed as sheeting....	5 cm.	10 cm.

DIRECT FIRE.

	Field artillery.	Heavy artillery.
Earth .....	1 to 2 m.	3 to 4 m.
Masonry .....	1 m.	3 to 4 m.
Snow.....about	8 m.	3 to 4 m.

## THE BRITISH ARMY.\*

BY LIEUT. CHARLES A. RHODES, 6TH U. S. CAVALRY.

(From the Post, Washington, D. C.)

MUCH has been said and written, the past few months, on the subject of the British Navy,—that mobile force which can be so quickly concentrated in the uttermost parts of the world for either offensive or defensive warfare.

But we can rest assured, judging from the precedents which we have before us, and the proverbial tenacity of the British nature, that should war occur,—and the chances at present seem to grow beautifully less,—the use of the army would be absolutely necessary in any struggle except that with a third-rate power.

England would do nothing by halves, and her opponent, whether a power of the eastern or of the western hemisphere, would certainly make every effort to carry the struggle into English territory. Whether she would be foiled by the English fleets, is a matter open to conjecture. England can certainly reply that for hundreds of years it has only been a matter of con-

\*Copyright, 1896. By permission.

lecture. Von Moltke is said to have stated that he had a dozen plans for the invasion of Great Britain, but none for getting out.

Be this as it may, with the complete supremacy of the seas contested by several powers, with the English army scattered in dribblets from one end of the world to the other, with an absolutely necessary garrison for the British Isles and that costly jewel of the orient,—India,—it becomes a matter of much interest to know just what forces England has at her disposal for an offensive-defensive campaign, their present state of efficiency, and whether she could spare an army of decent size for foreign invasion.

As in our own country, military service has never been a popular institution with the English people. So that, unlike most European powers, England, like ourselves, has relied on voluntary enlistments to fill the ranks of her army. That she has been able to do so, must not be construed as an indication of pure patriotism in her recruits, although the British are nothing if not patriotic. But English officers themselves complain of late, of the quality of recruits furnished. Even so distinguished an authority as the Commander-in-chief, Lord Wolseley, writes, "in order to make both ends meet, we have to send young and immature youths to fill up the annual wear and tear of our battalions abroad."

The foreign press even goes so far as to characterize the present class of English recruits as "ill-fed and undersized boys." It is significant that the English ration for one man per day, consists of only three quarters of a pound of meat and one pound of bread. All extras must be purchased from the recruit's meagre pay. In comparison with this is the ration of the United States soldier, of twenty ounces of meat, eighteen ounces of bread, a generous share of vegetables, and coffee, sugar, and other necessities in abundance.

Military command in Great Britain, is exercised through general officers commanding military districts in England, Ireland, Scotland, and Wales,—each district representing a brigade.

England and Wales are divided into ten of these districts, the Woolwich and Aldershot districts, involving only the troops at these immediate stations, while the others have troops spread over a wide area. Ireland has four districts under a commander-in-chief while Scotland has but one. These brigade districts are again sub-divided into regimental districts, sixty-seven in all, and to each is assigned suitable territory for recruiting for the regular and volunteer militia services.

At the headquarters of each "brigade district" is, theoretically a brigade, consisting of two battalions of regular troops, two of militia, and a depot. The two regular battalions on home-service act as a feeder to the two other "linked" battalions of the same regiment abroad, and as the recruits for both line and militia are drilled under the same discipline, and officered by officers from the line battalions,—assisted, when necessary, by militia officers, a healthy spirit of coöperation grows up between line and militia which gives higher efficiency to the militia and stimulates recruiting.

The English recruit is enlisted for twelve years, seven of which is spent with the colors if at home, or eight, if abroad. The remaining five or four

years, as the case may be, is spent in the first-class reserve, where though liable to service, he is rarely if ever called out for training, and receives a small income. As the recruit is enlisted from the ages of eighteen to twenty-five years, the class, as a whole, is very young for rough foreign service, especially as the physical requirements for infantry recruits are but five feet four inches in height, and thirty-three inches in chest measurement. For the Foot Guards the standard is much higher. There are also "specially enlisted" men, who are below the standard, physically, but are expected to develop.

Unlike the infantry regiments, to which the "linked" system just described, applies, the cavalry regiments recruit for themselves, and have no depot. Recruits and remounts are sent directly to the headquarters of the regiment, if the latter is at home; and if abroad, a detachment is left behind to recruit, train, and forward the men as required.

For the artillery, the United Kingdom is divided into nine districts, each under a lieutenant colonel of the line, who commands the militia and volunteer artillery in his district, and at the depot of the district, recruits for the Royal Artillery.

In the British infantry, the battalion is the unit, unlike the system in vogue in our own and in continental armies. This unit is normally divided into eight companies, aggregating, at home, eight hundred and one men of all ranks; while the battalions on foreign service, which are always supposed to be on a war footing, aggregate one thousand and ninety-five men of all ranks. There are at present one hundred and thirty-three of these battalions in Great Britain, fifty-two in India, thirteen in the Mediterranean, five in Egypt, and six in other colonies; and one can judge of the magnitude of the recruiting service necessary to fill all these organizations and keep them continually up to their proper strength by voluntary enlistments.

The British infantry soldier is equipped with the Lee-Metford magazine rifle, calibre .303. This weapon is an excellent one, of the bolt system, carries ten cartridges in the magazine, and, like our own new magazine rifle, can be used either as a repeater or single loader. The bullet is of a composition metal of lead and antimony, coated with a nickel-copper envelope, and is 1.25 inches in length, and weighs 215 grains. The explosive is a smokeless powder called *cordite*. The rifle weighs nine pounds, ten ounces, and is equipped with a sword bayonet, twelve inches in length. The sight is arranged for distances ranging from 200 to 2900 yards.

The infantry soldier is further equipped with a "valise equipment," which is a valise or bag, intended to contain the field kit and twenty additional rounds of ammunition. This equipment is attached to the soldier's back by straps passing over the shoulders and fastening to the belt. The overcoat is either on the person, or attached to the belt, while the mess tin lies between the valise and coat. Attached to the waist-belt in front, are two pouches, containing eighty rounds of ammunition. A haversack and water bottle are strapped over the shoulders. Fifty per cent. of the infantrymen carry intrenching tools,—a small spade with pick handle.

Each cavalry regiment is composed of four squadrons,—each squadron, like our own system, being under command of a major, but with a captain

and two subalterns as subordinates. The cavalry regiments are divided, as regards the weight of men and horses, into heavy (five regiments), medium (thirteen regiments), and light (thirteen regiments), aggregating thirty-one regiments or one hundred and twenty-four squadrons, in all. The regiments, since the Egyptian campaign of 1882, are apportioned as follows: fourteen regiments to England, one regiment to Scotland, six to Ireland, one to South Africa, nine to India, and one to Egypt. The age of the remounts at purchase averages four years, and they are subjected, as far as practicable, to twelve months training, before being regularly assigned to troop duty. But while the regiments abroad are doubtless kept up to their full strength, those stationed in Great Britain show a woeful discrepancy between the number of men and horses. Of twenty regiments stationed at home in 1893-94, having a total enlisted strength of 3190 men, the official returns of those regiments gave the total number of horses as only 1940. Twelve hundred cavalrymen are thus shown to be without horses, and it cannot, surely, be held by English officers that trained cavalrymen can be produced without horses!

All the British cavalry are armed with the carbine and sabre, and the lancer regiments have, in addition, the lance. The carbine is a magazine arm, called the Martini-Metford, using the Lee-Metford ammunition. It has a length of three feet, one and one-eighth inches, a calibre, the same as the rifle of .303 inches, and a weight of eight pounds, one and one-half ounces. The leaf of the sight is graduated for distances ranging from two hundred to fourteen hundred yards. All the rank and file of a cavalry troop carry the carbine, except certain non-commissioned officers who carry the revolver,—a weapon of the Webley pattern. The sabre, which is really not a sabre but a sword, is carried by all, attached to the saddle.

The British cavalry equipment varies according to the service to be performed, which, on account of the vast colonial possessions to be guarded, assumes a very wide range. In fact, the numerous equipments ordered for "drill," "service marching," "home marching," "review and field day," and "light service" are open to criticism from American officers, on the ground of lack of simplicity. There are, too, a number of little points that our cavalry officers would not think quite as practical as the United States equipment, but on the whole, the British cavalry equipment compares favorably with all the European equipments.

The Royal Artillery, the only arm of the line in which the officers are changed about, regardless of regiment, is subdivided into horse, field, mountain, and garrison artillery. The twenty batteries of horse, eighty batteries of field, ten batteries of mountain, and sixty-eight companies of garrison artillery, are distributed as follows:

Branch.	At Home.	In India.	In Colonies and Egypt.	Total (men).
Horse Artillery	1931	1889	.....	3820
Field "	7415	6338	.....	14253
Mountain "	184	945	176	1305
Garrison "	8306	3204	4794	16304

The official reports give the total number of field-guns provided for the artillery of the line as about six hundred, to which it is contemplated adding thirty-six, in the event of war. Most of these pieces are breech-loading 12-pounders, although a few batteries have still the muzzle loading 9-pounders. The mountain artillery guns, which have been found especially serviceable in India, are 7-pounders, and weigh only two hundred pounds.

As to the personal equipment, all ranks of the horse artillery carry cavalry swords, the drivers carrying pistols of the Webley pattern. In the field artillery, only the non-commissioned officers and trumpeters carry swords, —the drivers having the pistol, and the gunners the sword bayonet. The garrison artillery are furnished with carbines, to which is attached the sword bayonet.

Probably no other country in the world has so many small wars constantly on hand as England, and as a matter of course, a portion of her troops have had the benefit of constant field service. But as with our own small regular army, most of this service has been against savages, and semi-barbarous nations, whose method of fighting is totally different from that which would be pursued, were England at war with a civilized nation.

There is much to be said, however, that the small wars against savage peoples has had a tendency to develop the practical side of the troops engaged, and a hardy efficiency which would be particularly effective in more civilized warfare.

It is perhaps partially on this account, partially on account of the difficulty of securing suitable manœuvring grounds, and perhaps some parsimony on the part of Parliament in failing to appropriate the necessary funds, that England has had few annual manœuvres on a large scale. England has appeared to rely more on the *esprit* of her officers and men, and on the individual training of both, than to such practice in the handling of large bodies of troops, as is practiced by the other European powers.

The officers of the English army, are, taken as a whole, a very fine body of men. Those of the Royal Engineers are appointed from the graduates of the Royal Military Academy, at Woolwich, as are also, most of the officers of the Royal Artillery. A few engineer and artillery officers are appointed annually from the cadet graduates of the Royal Military College, at Kingston, Canada, and a few officers of the artillery-militia manage to be appointed into the artillery of the line.

Engineer officers, after appointment, are sent to the School of Military Engineering, at Chatham, for a two years' course of instruction, after which they become available for regular duty, either at home or abroad. The roster for foreign service is kept so that the officers at the top of the list, being those having longest home service, are first for duty.

The artillery officers, after appointment, undergo a course of instruction at the School of Gunnery, at Shoeburyness, lasting for six weeks or two months, where they familiarize themselves with all types of modern guns.

Officers of the cavalry and infantry, are appointed (1) from cadets of the Royal Military College at Sandhurst; (2) from lieutenants of militia passing a satisfactory examination; (3) from especially deserving sergeants.

Promotion, in the British service, is by seniority in each regiment (in



the artillery, it is by corps) up to and including the grade of major. After that, officers are specially recommended for command.

Non-commissioned officers are appointed by the regimental commanders, or in separate battalions, by the battalion commanders. They must pass a satisfactory examination in both professional and educational requirements,—the latter being equal to certain prescribed standards in the civil schools. Appointment to the higher grades of non-commissioned officer,—color-sergeant, quartermaster-sergeant, and sergeant-major, is by selection.

Infantry recruits receive two and one-half months' training before going into the companies; while the militia recruits receive only forty-nine days of instruction. In musketry practice two hundred rounds of ammunition is annually allowed for the soldier, whether recruit or old soldier. There is a gymnasium in every garrison, and recruits are required to exercise an hour and a half daily in the simple movements; the old soldiers have a more extensive course. This course in gymnastics is further augmented by one hour running drill, daily,—the course beginning with 300 yards, and being gradually extended to 1000 yards. There is also optional and special instruction given in field-sketching, fortification, gun-drill, signalling, duties of pioneers, methods of transportation, and litter drill. Provision is also made for the instruction of a detachment of one officer and thirty-two non-commissioned officers and men from each infantry battalion, in the duties of mounted infantry. To meet this possible requirement, should war be declared, proper camp equipage is kept in readiness at Aldershot, and a sufficient supply of horses for eight companies, is kept registered in readiness for mobilization.

Instruction as mounted infantry covers a course lasting two and one-half months, in riding, stable management, drill in single rank, and in firing. Up to the year 1892, 204 officers and 3670 non-commissioned officers and men, had passed through this course of instruction, and mounted duty has become so very popular and useful that instructional cadres have been formed, also, in Egypt, South Africa, and Burmah.

The instruction of the English cavalry is, as in most armies, quite complex. The recruit must needs learn to use his carbine, sword and lance, on horseback, and most of the infantry foot-drill besides. He pursues a course of seventy lessons in fencing, beginning with foils and singlestick, after which he has from ninety to a hundred and twenty lessons in the riding-hall. After this his course in musketry begins, firing two hundred rounds at distances up to eight hundred yards. All this completed, he may finally be merged into the squadron as a trained cavalryman.

On the 1st of March of each year the cavalry command begins its "field training," which continues for four weeks, commencing with elementary movements and continuing progressively into instruction in reconnoissance, outpost and advance-guard duties.

The artillery recruit, though his instruction has many things in common with his comrade of the infantry and cavalry, has many features peculiar to his arm of the service. After his preliminary recruit drill of from two to four months, he is given one year's instruction in the "drill book." During

this time, in order not to interfere with his progress, he is carried on a special roster for duty, and is no longer known as a recruit, but as a "young soldier." Moreover, artillery soldiers are classified as first, second and third class, according to their professional knowledge, and they may pass from one class to a higher one by competitive examination. Mounted artillerymen are likewise divided into three classes, according to proficiency in riding.

The artillery also has an annual course of training, lasting for five or six weeks in the garrison, and for twelve working days in the mounted artillery. It begins with a course of lectures on the theory of gunnery, the gun, projectiles, and sights; and is followed by gun-drill, making up ammunition, fuses, and fire discipline.

There are few good land ranges in England for gun practice, the best one being at Okehampton, in Devonshire, where each field battery practices once in three years!

The British army, all told, is composed as follows:

		Total of all ranks.
At Home .....	114,931	
Abroad .....	108,774	
First Class Army Reserve .....	80,000	
Militia Reserve for Reg. Army .....	30,000	333 705
Yeomanry Cavalry .....	11,000	
Militia, exclusive of Mil. Res .....	108,000	
Volunteers .....	260,000	379,000
Native Army of India .....		134,100
Grand Total .....		846,805

Besides the above, it is claimed that there are 800,000 men who have been trained as volunteers, one-fourth of whom would be available for mobilization, in case of war.

In case of war, the unit of organization would be the army corps, and it is contemplated by the English authorities to divide Great Britain, territorially, into eight army corps (30,000 men each), each corps, theoretically, to have its proper number of officers, and suitable proportions of the three arms. The headquarters of these army corps are to be located at Colchester, Aldershot, Croydon, Dublin, Salisbury, Chester, York, and Edinburgh,—each to be termed a "centre of mobilization." It is confessed by English writers that although Colchester, Aldershot, and perhaps Croydon, could probably secure their proper proportions of troops, the others would hardly be able to mobilize with a complete quota of artillery, cavalry, and transportation.

It is proposed to utilize the remainder of the forces as a garrison army and to protect lines of defense, erected in recent years,—among other places, Portsmouth, Plymouth, Dover, Chatham, Harwich, Pembroke, Edinburgh, Cork, Dublin, and the Channel Islands. The garrisons for these points would be made up, as far as practicable, of a nucleus of Royal Artillery, augmented by militia artillery, volunteers, available infantry battalions,

and pensioners. It is also contemplated to protect the extensive sea coast of the British Isles, by organizations known as "local brigades," to which are entrusted the duty of patrolling the coasts, and of resisting and sending information of the landing of hostile troops.

At the call for mobilization, it is planned that the troops of the regular establishment would be at once filled up to a war strength, by complements from the army reserve men. This would of course apply more particularly to the troops at home, as those abroad are theoretically kept nearly to their full strength.

For the cavalry, the horses kept registered for purchase, would be at once called out, and the additional horses, if any needed, obtained by purchase. The Depot at Canterbury, is named as the centre point for the mobilization of cavalry reservists.

In the artillery, the field forces are supposed to have always on hand their complete war equipment, so that it is contemplated that this arm would simply need to be increased in numbers.

On receiving the order for mobilization, officers commanding reservists immediately post proclamations (which are always kept in readiness) in public places; while officers paying reservists, immediately mail to the reservist's last address, an order to join, accompanied by three shillings.

The English law in regard to the calling out of the auxiliary forces, is somewhat peculiar.

(1) The militia reservists are always liable to service abroad, but the militia is only available for home defense.

(2) The yeomanry can be called out, whenever the militia is embodied, that is, in cases of great national danger, but cannot be employed outside of Great Britain.

(3) The volunteers can only be called out in case of actual or apprehended invasion, and are not available for duty outside of Great Britain.

It is thus worthy of note, that for the defense of Great Britain, all the national forces are available, while for the defense of Ireland, the law only authorizes the use of the regulars, the army reserve, and the militia.

When emergencies arise, the law allows the government to take possession of the railroads, and the plant thereof, the roads being simply controlled by the military authorities, while the work is carried on by the regular staff of workmen.

Provision is also made for the transportation of expeditionary forces by the hiring of troop-ships, by the Transport Department of the Admiralty. The government has at present on hand the troop-ships, *Crocodile*, *Euphrates*, *Malabar*, and *Serapis*, belonging to the Indian government; and the *Himalaya*, *Tamar*, and *Assistance*, belonging to the home government. For the transportation of extra horses by sea, special fittings for vessels to carry them, are kept constantly on hand.

As to how great a force could be spared from India, in case of war, everything would of course depend upon the will of those powers who are struggling for mastery in the Orient.

There are, in India, 72,648 British soldiers, 11,303 horses, and 318 guns, this force forming only about thirty-six per cent. of the entire Indian

army. The remaining sixty-four per cent. consists of 134,100 native soldiers.

Of this force, judging from past experience, a good sized army could certainly be spared for foreign invasion.

- (1) In 1801, India sent an army to Egypt.
- (2) In 1810-11, she sent an army to Mauritius and Java.
- (3) In 1842, she sent four regiments of Englishmen, and six regiments of native troops, to China.
- (4) In 1856-57, she sent an expedition to Persia.
- (5) In 1860, she sent out another China expedition.
- (6) In 1867, the Abyssinian expedition.
- (7) In 1872, Perak expedition.
- (8) In 1878, she sent Indian regiments to Malta.
- (9) In 1882, she sent to Egypt a cavalry brigade, consisting of three native regiments; one field battery, one mountain battery and two companies of sappers; one infantry brigade, and one reserve infantry brigade, each composed of one British battalion, and two native battalions.

The latest reports on the subject of the total war strength of the land forces of the principal powers, is given below. That of the United States, includes a regular army of 27,832 officers and men, and a militia force of 114,146. The strength of the other countries named, includes the regulars and reserves, and, in the case of Great Britain includes the forces in India and the colonies:

Russia .....	4,988,637
Germany .....	4,643,432
France.....	2,907,077
Italy.....	1,998,880
Austria .....	1,475,017
Turkey.....	921,440
Great Britain.....	662,000
United States.....	141,978

## PRESENT CONDITION OF THE ARTILLERY ARMAMENTS OF FOREIGN COUNTRIES WITH REGARD TO THE USE OF CURVED FIRE AND HIGH EXPLOSIVES.

BY FIRST LIEUT. G. W. VAN DEUSEN, 1ST U. S. ARTILLERY.

(From the *Revue d'Artillerie*.)

UNDER the heading "Curved Fire or High Explosive Shells" the *Revue* recently gave an analysis of an Italian article in which the author, Major Mariani, discussed the means at the disposal of field artillery for firing at troops under shelter.

Three solutions are advanced; they result from the use of—

1st. A field mortar or howitzer.

2d. A high explosive shell with time fuse, having a thick wall and a comparatively small bursting charge.

3d. A high explosive shell with percussion fuse, having a comparatively thin wall and a bursting charge as large as possible.

With an idea of throwing light upon the subject, it has been considered a good plan to examine into the present condition of other powers regarding these several points. The results of these inquiries are as follows:

GERMANY.

*Curved Fire.*—The German artillery has no field howitzer or mortar that can properly be so called. Nevertheless the question of curved fire in the field by means of special pieces has been studied in Germany for a long time. In February, 1892, the *Revue* mentioned the firing experiments that had just been made with field mortars joined together in batteries. These experiments were apparently satisfactory but have not led to the adoption of pieces of this class. On a very recent date, the *Allgemeine Militär-Zeitung*, No. 73, September 12, 1895, mentioned the probable adoption of a 12 cm. field howitzer. The passage reads as follows: "It being an undisputed fact that in modern war certain objectives will be encountered in the field that can only be successfully attacked by curved fire, the expediency of adopting a field-piece for that purpose, either howitzer or mortar, is at present being warmly discussed in military circles. In order to completely accomplish its end, such a piece must easily be manœuvred by artillery troops in the field and consequently its service must approach as nearly as possible to that of the other field artillery. With this object in view, a trial is to be made of a 12 cm. howitzer."

In addition, while discussing the question of curved fire, we must mention the 15 cm. howitzer and 21 cm. mortar which are attached to the foot artillery siege trains. The functions of these pieces have been mentioned in the *Revue*, November, 1895. The 21 cm. mortar is so heavy that it must be removed from its carriage and carried on a truck, which, when loaded with the piece, weighs about 4500 kg., a weight that is entirely out of the question for field artillery.

The 15 cm. howitzer approaches more nearly to a field-piece. The piece with wagon weighs about 2600 kg.; while this weight is evidently rather large for a piece that is liable to be moved off regular roads, it is nevertheless not impossible, since it is nearly in the same class with the field caisson when the six cannoneers are mounted on the chests. The German caisson with six cannoneers, model 73, weighs 2620 kg., model 88, 2515 kg.

*High Explosive Shells.*—The solution adopted in Germany is a time shell with thick walls and a comparatively small bursting charge. The shell is of steel and weighs 7.5 kg. It contains 170 gr. of explosive and bursts into about 500 pieces. It is a comparatively short projectile, the length (including fuse) being only 2.6 cal. The opening of the cone of dispersion is about 110°; inside this is a vacant space with an angular opening of about 90°. This projectile is provided with the same double action fuse as the shrapnel; this fuse is graduated up to 4500 metres. The same range table serves for both projectiles.

Each battery has in its chests 885 rounds. Of this number 150 are high explosive shells, representing a proportion of 17 per 100 of the total supply.

## ENGLAND.

*Curved Fire.*—No piece of this class has yet been adopted in England, but for several years the matter of howitzers for siege parks or field batteries suitable for use in the attack of fortified places has been considered. The first plan was for a 12.7 cm. field howitzer weighing 610 kg., but the actual trial was made with a field howitzer of 11.8 cm. During the firing the piece recoiled by sliding in a muff or jacket while the carriage was fastened to the ground.

*High Explosive Shells.*—The English field artillery has no high explosive shells.

## AUSTRIA-HUNGARY.

*Curved Fire.*—There are no field howitzers or mortars, properly so called, in this country. The question of field-pieces for curved fire has passed through several phases in Austria.

A few years ago the military experimental board tried a 12 cm. field howitzer of bronze-steel. But the experiments looking to the adoption of a special field-piece of large calibre seem to have been, if not altogether abandoned, at least suspended, since the adoption of the 15 cm. battery howitzer. This piece seems intended to play a very extended rôle, being used not only as a siege and position gun, but also, to a certain extent, as a field-piece. The following is a translation of a passage in "von Löbell's Jahresberichte" upon this subject.

"The trials of 12 cm. field howitzers have ceased. The idea of introducing into the field artillery a piece of this nature has been given up. For cases in which field service calls for the use of curved fire, it is intended to utilize 15 cm. mortars or howitzers grouped together in light siege batteries."

In addition, Gen. Wille in his work entitled "Waffenlehre," says that "the construction of a 12 cm. howitzer intended for the Austrian field artillery, commenced several years ago, has been abandoned," and furthermore gives the following information regarding the present organization of groups of light siege batteries in Austria.

"There exist in Austria five groups of light siege batteries, each group consisting of three batteries and an ammunition park. Each battery is composed of four howitzers. To each group is attached a company of fortress artillery to which is added, for horse instruction and carriage drill during time of peace, the following personnel: 18 drivers, two saddle-horses for officers, 2 saddle-horses for non-commissioned officers, 16 draught horses and 2 spare horses."

The following details from the manual of Captain Korzen complete the information previously given in the *Revue* regarding the battery howitzer intended for the groups of light siege batteries.

The howitzer is of bronze, 15 cm. calibre and weighing, breech-block included, 1130 kg. It is mounted upon a battery carriage whose height to cap-squares is 1.4 m. This carriage, furnished with all equipments, weighs 1350 kg. The weight of the limber is 400 kg. The howitzer fires—

1. Common shells, Model 1880, weight 31.9 kg.
2. Shrapnel, Model 1880, weight 36.9 kg., provided with fuse, Model 1893.
3. Canister.



There are four different charges of smokeless powder weighing respectively 260 gr., 350 gr., 460 gr., and 750 gr., giving the projectile initial velocities varying from 164 to 291 m. for common shell, and from 156 to 276 m. for shrapnel.

It must also be noted that Austria has never lost sight of the necessity for providing field artillery with means of using curved fire. For a long time a certain proportion of the supply of ammunition of field batteries has been made up of cartridges with reduced charges for plunging fire, called "Wurfpatronen." Use has also been made of cartridges which can be divided in two parts.

It was not until very recently, since the adoption of the smokeless powder, Model 1893, that a single charge of 440 gr. was fixed for the 9 cm. field gun.

*High Explosive Shells.*—An Ecrasite shell was adopted in 1894 for the mounted batteries of field artillery. This projectile weighs 7.25 kg.; it is provided with a double action fuse and its initial velocity is about the same as that of the 9 cm. common shell, that is, about 445 m. The different army corps do not seem to have yet been provided with the complete proportion of these shells. According to the budget for 1896, each Austrian mounted battery of eight guns should have, per piece, 15 shells of this class in lieu of an equal number of common shells. By this arrangement, each battery would have in its chests 1024 rounds and the proportion of high explosive shells would be 11.7 %.

Ecrasite is an explosive with a base of picric acid. According to the "Dictionary of Explosives" of Cundill and Thomson, this explosive is composed of tri-nitro cresylate of ammonia and of nitrate of potash. It is used in a liquid state in projectiles and compressed in petards. For causing the explosion a priming of gun-cotton is generally used. Ecrasite absorbs moisture rather freely but is quite stable and very slightly affected by heat and by shocks, friction, etc. The smoke produced in bursting is dark in color. The explosive strength is about 10/7 that of dynamite.

#### BELGIUM.

*Curved Fire.*—The Belgian artillery has no field howitzer or mortar. There are now in the siege trains two pieces light enough to assume, in an emergency, the rôle of field pieces; a 15 cm. mortar which uses projectiles weighing 31.5 kg. with a charge of 1.6 kg. and a 9 cm. mortar which fires a shell weighing 6.8 kg. with a charge of 300 gr. But there is nothing in the arrangement of the carriages and matériel of these pieces which would indicate any possible intention of utilizing them for field work.

The field artillery is armed with 7.5 cm. and 8.7 cm. guns. Up to the present time, at least so far as we have been able to discover, only black powder is used, and no fractional charges. But the recent publication (1895) of "L'Aide Memoire de Manœuvres et de Campagne" of Lieut. Gen. Fix would indicate a modification of this idea. This general officer does not give the details of the charges used in the field batteries, but he indicates the loading of the artillery ammunition columns and this indication gives the idea that Belgium has adopted, for curved fire in the field, the

solution long used in Austria, reduced charges. According to the work above mentioned, each 9 cm. caisson of the ammunition column contains 100 cartridges of 700 gr., 18 small cartridges of 310 gr. and 18 small cartridges of 470 gr.; each 8 cm. caisson contains 108 cartridges of 530 gr., 15 small cartridges of 330 gr. and 15 small cartridges of 200 gr. It is evident that this refers to charges of smokeless powder. The largest charges, corresponding to the total number of projectiles, are intended for ordinary firing; as for the small charges, they are surplus and evidently intended for special cases where plunging fire might be needed.

*High Explosive Shells.*—None are used.

#### BRAZIL.

*Curved Fire.*—The question of field-pieces for curved fire has been recently agitated in Brazil on account of an offer made by Krupp to Col. de Madeiros, president of a purchasing commission sent to Europe by the Brazilian government. The proposal of Krupp was in regard to 30 field howitzers of nickel steel, able to fire high explosive shells. Col. de Madeiros sent this proposition to the Brazilian Minister of War, appending a report giving the history of the question of high explosive shells, and calling attention to the fact that the Argentine Republic, Brazil's most probable enemy, was about to increase its field artillery, and a portion of this increase was to be in pieces of this nature. The decision of the government was unfavorable to the proposal, some of the reasons being given below:

"War will be carried on in South America, as a general thing, in a manner entirely different from in Europe. Consequently we will have to modify marching as well as fighting tactics, if not in principles, at least in details. For these reasons and for others which are for ourselves alone, the necessity does not appear for the introduction into our army of the proposed innovation, which would be for us a source of difficulty and danger, and would compromise the mobility and usefulness of our field artillery. Furthermore, artillery is even now in a condition to fire projectiles charged with high explosives with ordinary means of propulsion; hence there is no need for having recourse to special engines such as pneumatic guns, or to fire-arms of a special metal, bronze or steel, with the object of resisting the violent effects of premature explosions. It is then useless to adopt pieces of nickel steel, the price of which is so much higher than common steel."

*High Explosive Shells.*—None are used in the field artillery.

#### BULGARIA.

*Curved Fire.*—A 12 cm. Krupp field howitzer is used in the Bulgarian field artillery. A battery of these howitzers is attached to each division of the active army.

*High Explosive Shells.*—None are used.

#### DENMARK.

*Curved Fire.*—The question of purchasing some 12 cm. howitzers on field carriages is now under discussion.

*High Explosive Shells.*—Experiments are now in progress with these, but not, apparently, with a view to their use as field projectiles.

## SPAIN.

*Curved Fire.*—According to a Royal decree of April 20, 1893, fixing the models of fire-arms, a mortar and howitzer are provided for siege, position and field artillery. The mortar, called 9 cm. mortar, Model 1892, is of bronze steel and belongs to the Mata system; its calibre is 8.7 cm., weight, 81 kg. It fires with a charge of 370 gr., a common shell weighing 6.3 kg. and a shrapnel weighing 7.1 kg., with initial velocities of 219 and 200 m. respectively. The howitzer, still under advisement, is also of bronze steel; its calibre is 12 cm., weight 600 kg. It fires with a charge of 1.8 kg. a common shell and a shrapnel, each weighing 18 kg.

*High Explosive Shells.*—The Spanish field artillery has none.

## ITALY.

*Curved Fire.*—Italy has no field howitzer or mortar properly so called. The article by Major Mariani leaves no doubt as to this point, although, according to Gen. Wille, Italy has, following the example of Russia, engaged in trials of field mortars, and has apparently ended by the adoption of pieces of this nature.

But the Italian artillery has, in the siege trains, pieces which would probably be available, in an emergency, for use in the field for curved fire. Especially may be noted a 9 cm. mortar which can be carried on mule-back and which seems to be intended for use in the first line against intrenchments that may be encountered in mountain warfare. This mortar is of compressed bronze, 8.7 cm. in calibre, and weighs 110 kg. It fires, with charges varying from 50 to 200 gr., a common shell weighing 6.76 kg., a shrapnel weighing 6.916 kg., a canister weighing 7.125 kg., and a high explosive shell, recently adopted, weighing 8.8 kg. and containing 1.8 kg. of Eversite, an explosive with a picric acid base. The weight of the carriage is 125 kg.

It should also be noted in addition that the 9 cm. field-gun uses three different charges of Filite; the ordinary charge is 460 gr.; the second, larger than the first and allowing an increased range under certain conditions, is 570 gr.; the third is a reduced charge for plunging fire and weighs 255 gr. Filite has a composition similar to Balistite, namely, equal parts of nitro glycerine and gun-cotton. It is used in the shape of a strip of square cross section, the length corresponding to that of the cartridge. The thickness is 1 mm. for field-guns. The cartridge is terminated at each end by a small cylindrical cap of Filite in grains which serve to hold the ends of the strips together.

*High Explosive Shells.*—There have been no high explosive shells for field-guns.

## JAPAN.

According to Major Mariani, the Japanese had at the siege of Port Arthur batteries of Krupp howitzers which "could accompany the bayonets of the infantry up to the moment when they were crossed with those of the defenders," and so several works were taken at the first assault.

The *Army and Navy Gazette* (No. 1636, Dec. 29, 1895) attributes the

success of the Japanese in a great degree to the high angle howitzers with which their army was provided.

According to this journal, these pieces were of a relatively small calibre and fired projectiles weighing 36 kg. Still we must not conclude from this that field howitzers are necessarily meant, since, for the attack of Port Arthur the Japanese used a siege train, the pieces of which were placed in position during the night preceding the attack at a distance of about 3500 metres from the Chinese forts.

#### UNITED STATES.

*Curved Firs.*—A field mortar, Model 1891, is in use in the United States. This mortar is of steel with the same calibre as the heavy field-gun, 3.6 inches (99.4 mm.), weight 111 kg. It fires with a charge of 425 gr. the same projectiles as the field-gun, namely, shell and shrapnel. These projectiles weigh 9.07 kg. and have an initial velocity of about 200 m.

The carriage is not mounted on wheels.

The mortars are carried in pairs on special carriages; the unloading and placing in battery require 3 minutes 10 seconds.

*High Explosive Shells.*—The field artillery has none.

#### RUSSIA.

*Curved Fire.*—The Russian artillery has used a field mortar since 1886.

This piece has a calibre of six inches (152.4 mm.) It weighs 460 kg., and the carriage 680 kg., implements included. This mortar was described by the *Revue* in 1895. Russia will have by the end of 1896, twenty-six batteries of mortars, each one comprising 6 pieces, 18 ordinary caissons, 6 two wheeled caissons and 12 assorted wagons.

*High Explosive Shells.*—Besides the powder filled shell and the shrapnel mentioned in the previously cited article in the *Revue*, this mortar fires a shell loaded with Melinite, which, to the best of our knowledge, is mentioned for the first time in a work on artillery recently issued by Boudaevski. The following are some of the details of the projectile.

It is three calibres in length. The base is screwed to the cylindrical part, and the ogive is part of the body. It is provided with a case in which is placed when needed a detonator primed with a percussion fuse. The charge is 5.7 kg. The total weight of the shell is 28.4 kg. According to Korzen the field gun also fires a high explosive shell; the materials of which the explosive is formed are liquid at the time of loading.

#### SWEDEN.

*Curved Fire.*—The Swedish artillery has made some trials of matériel of this class but the results have not been promising enough to justify the adoption of a supplementary field-piece.

Furthermore, this artillery makes use of position pieces, intermediate between field and siege, which can, to a certain extent, be used for curved fire in the field.

*High Explosive Shells.*—The question of adoption of high explosive shells for field artillery has been investigated in Sweden. Trials have been

made with a steel shell weighing 6.64 kg., and charged with gun-cotton. But the Swedish Artillery Board has temporarily suspended the investigation.

According to the *Artilleri Tidsskrift* the following are the reasons given for this action.

"In Sweden and in the neighboring countries against which the Swedish artillery might be called upon to act, the obstacles which this artillery will meet are not strong enough to warrant the creation of new engines, the use and construction of which are dangerous. The defensive possibilities of the houses, in particular, are feeble, and projectiles would pass clear through the houses and out the other side before exploding. In addition, the time firing of high explosive shells, whose effects are very violent but which act in a very limited zone, is so much at the mercy of an error of elevation or direction that it seems preferable to persist in the use of shells loaded with balls for firing against troops."

#### SWITZERLAND.

*Curved Fire.*—The field artillery has no howitzer or mortar properly so called. But the position artillery, which, in Switzerland constitutes a special and distinct subdivision of the fortress artillery, includes in each of the five groups composing it 12 mortars of 12 cm. calibre upon field carriages with movable platforms. These pieces are of bronze or steel. The weight of the bronze mortar is 631 kg.; of the steel, 534 kg. The corresponding piece carriages, including platforms, weigh respectively 2208 and 2111 kg., and the caisson 2362 kg. The pieces and caissons are each drawn by four horses.

The 12 cm. mortar fires shell and shrapnel each weighing 18 kg.

*High Explosive Shells.*—There are no high explosive shells for field-guns made especially for that purpose. Recently a certain number of the 12 cm. shells already provided have been changed to high explosive shells. A steel shell is under consideration.

#### TURKEY.

*Curved Fire.*—Turkey decided in 1895 to arm two regiments with howitzers. These pieces are Krupp, 12 cm. calibre.

*High Explosive Shells.*—There are none in the Turkish artillery.

### THE STRUCTURE AND FUNCTION OF THE HORSE'S FOOT.\*

BY VETERINARY CAPTAIN F. SMITH, F.R.C.V.S., F.I.C.

THE structure and function of the horse's foot is a subject which is not only of theoretical interest, but of supreme practical importance. When I tell you that half the unsoundness and at least half the lameness among horses in this kingdom are due to trouble either in or near the foot, you will, I am sure, agree with me that it is impossible to overestimate the importance of the subject which I have to bring before you this evening.

\* A paper read before the Royal Institution of Great Britain, May 3, 1895.

The reason why the foot should be such a frequent seat of unsoundness is not difficult to understand when we remember the unnatural conditions under which horses both in town and country have to work, and, further, the risk they incur from shoeing.

Shoeing is a necessary evil, but the harm resulting from the application of a shoe to the foot is not in itself great; it is the abuse of shoeing which constitutes the danger. The serious and senseless mutilations which are practiced on the foot rob shoeing of much of its value, and constitute it a standing reproach to our civilization.

I regret that the time at my disposal will not admit of the question of shoeing being touched on; but during this discourse, as opportunity occurs, I will allude to some of the great evils which are practiced in this indispensable art, evils which I may at once say might in a few months be swept away throughout the length and breadth of the land, if the horse-owning community possessed even an elementary knowledge of the manner in which the horse's foot is built up, and the use of its various parts.

It is probable that the majority of laymen regard the foot as a solid block of horn placed at the end of the limb, and on which the horse stands. I shall hope to show you that the foot is a highly specialized structure, endowed with tissues possessing acute sensation, mechanisms by which concussion is warded off, a blood supply unequalled in any other part of the body, the whole being inclosed within a covering of horn known as the hoof.

The foot is therefore divided into two parts, a core consisting of bones, blood vessels, tendons and other tissues, which in shape resembles a miniature hoof, and enveloping this a covering of horn possessing neither blood vessels nor nerves; the first is called the sensitive, the other the insensitive foot, and the two fit together much as a finger fits into a glove.\*

Various names have been given to the different parts of the foot: For instance, the wall is the portion visible when the foot is on the ground; the position of the sole is obvious; while a wedge-shaped piece of horn placed in the central and posterior part of the foot is vulgarly known as the "frog"—we shall speak of it as the foot pad; finally, a portion of the wall inflected at the heels forms a part known as the bars.

It is impossible to completely grasp the function and structure of the foot unless we possess some information as to the nature of horn.

If horn be examined under the microscope, it is found to consist of cells which resembles the scales found on the skin; in fact, hoof is modified skin, the cells forming which have, by a process of compression and chemical change, become converted from scales of skin to scales of horn.

The essential microscopical feature is the presence of canals, around and between which the cells are arranged, uniting and knitting the parts together in such a way as to produce the tough, yielding material known as horn. The tubes run through the entire length of the structure. They are not completely hollow, as the name might imply, but are lightly packed with very soft cells.

\*A working model of the foot twelve times its natural size was kindly built for this lecture by Captain Gillespie, army service corps, to whom I am very greatly indebted.



Horn which is dry, as in any of the feet on this table, is as brittle as glass and fractures like a piece of glue. Horn which is moist cannot be broken; it can be twisted and torn but only with difficulty. Under pressure the moist horn yields, the dry horn breaks.

The moisture in the foot is something very remarkable. In the foot pad it amounts to 42 per cent., while in the wall, which is the driest, it falls to 24 per cent. The use of this moisture is to keep the foot pliable and yielding; where, therefore, the greatest yielding is required there the moisture is the largest, and where resistance is most needed there the moisture is the least. I shall constantly have to refer to the moisture in horn, for, as you will see later, it is the essential factor in the foot around which all the others work.

It is through the cells and tubes in the horn that a constant passage of water occurs, by which means the foot maintains, in spite of the evaporation which is taking place from it the amount of moisture it requires.

We spoke of the sensitive being buried within the insensitive foot; it is from this sensitive foot that the horn is secreted, the process being a slow and gradual one. If we examine a horn-secreting surface, it will be found covered with delicate projections known as papillæ, about one-quarter to one-half inch in length; these papillæ fit into holes in the horn, and the tubular formation of horn is due to the fact that it is pierced at its origin for the reception of papillæ.

The wall of the horse's foot is divided, for convenience of description, into the toe, quarters and heels. The thickness is greatest at the toe, and decreases gradually toward the heels, where it is thinnest; but the wall at the heels, instead of being continued so as to complete the circle of the foot, suddenly turns in and travels in a forward direction between the sole and foot pad. This portion is called the bar, and the practical lesson which has to be learned is that the bar is part of the wall, is intended to bear weight and should not be cut away in shoeing, as is so commonly practiced. In a foot of a wild horse shot in Thibet—of which a plaster cast is placed on this table—the most extraordinary development of the bars is shown.

It is obvious that by the inflection of the wall the heels of the foot are considerably strengthened; and this is especially necessary, as the circle of the wall is only an imperfect one.

The amount of moisture in the wall varies, depending upon its position relative to the horn-secreting surface. The horn-secreting surface of the wall lies immediately under the upper edge of the hoof; the nearer the horn is taken to this upper edge, the more moisture it contains, the further from the edge, the less the moisture. It is obvious therefore, that as the wall grows longer it becomes drier, and moderate dryness of horn is only another name for toughness, so that the portion of wall in contact with the ground is much harder than the portion above the ground.

The growth of the wall under normal conditions is the same at any part of its surface; if it grows an inch at the toe, it grows an inch at the quarters and heels. You will observe that the wall at the heels is, roughly, only half the height of the wall at the toe, and, bearing in mind what has

been previously said about horn becoming drier as it increases in length, you will have no difficulty in understanding that the horn at the toe is older and tougher than the horn at the heel, which, from being much younger and shorter, contains more moisture and is, therefore, elastic and yielding. If, for example, we assume the length of the wall at the toe to be four inches, and that at the heel to be two, it is obvious that the wall at the toe is double the age of that at the heel; and if we continue this investigation further by drawing lines around the wall parallel with the upper edge of the hoof, it will readily be seen that the portion in contact with the ground is of varying age, being oldest at the toe and gradually decreasing in age to the heel, in other words, being hardest at the toe and softest at the heel.

There is an object in all this which we must now inquire into. When a horse's foot comes to the ground in either the trot, canter, or gallop, viz., in any pace which causes concussion, the heel is the first to make contact with the ground; by this means, as we shall hope to show, the shock of impact is considerably reduced, for the soft tissues of the posterior part of the foot yield slightly under the strain instead of offering rigid opposition, and this yielding, which we shall have to deal with more fully later on, is permitted to occur through the young moist horn which exists at this part.

From the heel the weight is transmitted along the foot from rear to front, and finally the heel becomes raised, the toe alone bearing on the ground. This is the position in which the greatest wear and tear of the foot occurs, for the toe is now engaged in giving the propulsion to the body, the friction is, therefore, considerable, and to meet this the horn at this part is comparatively dry and very tough.

We can see, therefore, that the variations in the amount of moisture in the wall are intended to meet the wear and tear of the foot.

The use of the wall is to support the weight of the body; the horse's weight is literally slung inside its foot. This slinging apparatus is infinitely stronger than if the weight were imposed, as we might imagine, on the sole of the foot, and, in addition, it is distributed over a larger surface than it otherwise would be.

When we remember that the mean weight of a horse is 10 cwt., and there are many which weigh 15 cwt. or more, there is no difficulty in observing that the foot is really an extremely small base on which to impose this enormous weight. The area of the human foot appears to be greater than that afforded by the horse's foot, but I shall now have to show you that the slinging apparatus previously spoken of increases in a remarkable manner the internal surface of the horse's foot without adding to its circumference.

Found on the inside of the wall are 500 or 600 plates or leaves of horn which run in the direction of the fibres of the foot—they may be seen in this model. In length they nearly correspond to the wall, while they are so thin as to be perfectly transparent. Regarded by themselves, their function is not very evident; but if we examine the exterior of the sensitive foot, it will be observed that it is covered with a very large number of deli-

cate sensitive leaves, also of extreme thinness, and so full of blood vessels as to give a bright red color to the part.

These sensitive leaves or laminæ correspond in number and position to their insensitive counterpart, and the two sets are found to be fitted into each other in such a way as to form the most perfect dovetail.

This dovetailing of the laminæ produces immense strength; by no ordinary process is it possible to destroy the union of these two surfaces, even after death; special methods have to be adopted in the study of anatomy if we wish to separate the horny from the sensitive laminæ.

But the dovetailing is further increased in strength by a remarkable arrangement. If we make a horizontal section of the two sets of laminæ in position and examine them microscopically, we find that each lamina, both horny and sensitive, possesses secondary laminæ, or lamellæ; of these there are about 150 to each primary lamina, so that we may say the union between the sensitive and insensitive walls is brought about by the dovetailing of 1000 primary and 150,000 secondary laminæ.

Here is a model of a single lamina 450 times larger than normal. The structure rather reminds one of a fern leaf or feather, the stem being the primary lamina and the lateral projections the secondary leaves.

So much for the slinging apparatus. If time permitted I could tell you much more of interest about it; and the undoubted evidence we possess that by it, and it alone, is the enormous weight of a horse's body solely supported.

We have one more point to discuss in connection with the laminæ, and that is the increase in the surface which they afford to the foot. The simplest method of explaining my meaning is to take the commonplace example of a book consisting say of 500 pages, which when bound in the ordinary manner is easily compressed into a body having a small surface, yet if each of the 500 pages be removed and placed side by side, the area they cover would be considerable. Much the same arrangement exists in the foot. By the folding up of horny and sensitive material a very large surface is disposed within a very small circumference, and careful measurements of the primary and secondary laminæ have led to the conclusion that the surface thus contained within each foot of the horse is not less than eight to ten square feet.

The next part of the foot to receive attention is the sole. This, as may be seen from the model and diagrams, is concave in shape toward the ground, which is evidence, if any were required, that it is not intended to support the horse's weight; that margin of it, however, in contact with the wall is doubtless capable of sustaining pressure.

The function of the sole is to save the sensitive parts situated above it from injury, and that it is eminently qualified for this purpose is evident to any one who has witnessed the intense lameness which arises from a stone getting wedged in the foot.

The sole grows from the sensitive sole, which may be seen in the diagram to be scarlet in color and covered with numerous projections, or papillæ, which fit into minute holes on the upper surface of the horny sole.

A peculiarity in the horn of the sole is the fact that it only grows a

certain thickness before it breaks off. The object of this is, that as the sole over its general surface is not in contact with the ground, it is exposed to little or no friction like that of the wall, which in a state of nature is maintained of proper length by the friction to which it is exposed. The sole is therefore shed on attaining a certain thickness, but no shedding occurs until a new sole of suitable thickness has been produced to take its place.

One of the common evils of shoeing is cutting away the sole of the foot. If we bear in mind the use of the sole, I am sure the ruin produced by this barbarous practice will be very evident to you. The sole cannot be too thick, and I have shown to you that nature provides for its exfoliation. Under the weight of the horse's body the sole slightly yields; but this we will discuss presently.

The foot pad, or, as it is commonly known, the frog, is peculiar both from its shape and the nature of its horn. The horn forming this body is very soft, and resembles rubber; it can be cut, but offers considerable resistance to friction, and when exposed to friction it wears away with a ragged surface in much the same way as rubber. Its pliability is due to the considerable amount of moisture it contains, which you may remember I stated was as high as 42 per cent., or about double that found in the wall.

This foot pad has a sensitive counterpart, a body composed of fibrous material containing fat, and so like fat in color that it has been termed the fatty frog. This sensitive foot pad fills up the entire space between the heels of the foot, and forms a dense cushion exactly resembling in shape the foot pad, and it is from the surface of this cushion that the horny foot pad grows.

There is no part of the horse's foot which has been exposed to more mutilation in shoeing than the foot pad; probably there is no part of the equine less understood, or one where more ignorance has been shown.

The impression among laymen is that the foot pad is a dangerous excrescence, which regularly at every monthly shoeing must be cut away to prevent the horse from becoming lame. This practice, I regret to say, is countenanced by people of intelligence, who in the matter of horse shoeing place themselves entirely in the hands of their servants.

The use of the pad is to save the foot and limb from concussion: its position in that part where I previously told you the largest amount of concussion is inflicted is evidence of this; further, the rubberlike nature of its horn is suggestive of a mechanism for the prevention of jar and shock. The shape of the pad, and the fact that in the unshod or carefully shod foot it is in contact with the ground over a large surface, is evidence that it must assist in providing a firm foothold and prevent slipping. Finally, from its position and use it keeps the heels apart and maintains the proper width of the foot.

All these facts can be absolutely demonstrated. Take, for instance, the last function accorded the pad, viz., maintaining the proper width of the heels of the foot. A simple experiment will demonstrate this to perfection. If we take a foot with a large well developed pad, and so shoe the horse that it does not come in contact with the ground, the heels of the foot become narrower every day, and in three months' time the part is beyond

recognition, the heels have curled in, the pad has folded in on itself so that it is not one half its original width, and the fibrous cushion previously mentioned as lying above the foot pad wastes away as it is thrown out of use.

We may now reverse the experiment, and shoe the horse in such a manner that what is left of the foot pad is made to rest on the ground; in a month, or even less, the most marked changes have occurred, the pad commences to unfold itself like a bud, the cushion becomes larger, the foot wider, and in three months the transformation may be complete. Such is an experiment which may be performed on any horse with absolutely identical results, and proves to demonstration that the pad is intended by nature to rest on the ground.

We must now take a cursory glance at the internal foot, as our time will not admit of a complete examination.

The bones found in the foot are three in number: two wholly belong to the foot, one belongs partly to the foot and partly to the portion of the limb above the hoof known as the coronet. Dealing only with the foot bones, one is found to resemble a miniature hoof in shape, is very porous in its structure, and has growing from each extremity a plate of cartilage which extends superiorly above the hoof and posteriorly as far back as the heels. The bone is porous to admit of the innumerable blood vessels for which the sensitive foot is remarkable, while the introduction of the plates of cartilage is to allow of lateral movement in the posterior part of the foot, such as would not be possible if bone existed in its place.

The second bone of the foot is one of the smallest, but practically one of the most interesting in the body. Its position can be seen in this model; and it is unfortunately the seat of the most incurable lameness to which the horse is liable. Beneath this small bone is a tendon which flexes the foot and keeps the bone in position.

Surrounding all these are the sensitive structures to which previous reference has been made. But before passing on to the final subject for our consideration, I must draw your attention to the remarkable vascularity of the foot; in few parts of the body do we find so many blood vessels. These diagrams can give you but a faint notion of the number of vessels in the foot, and even they deal only with the veins; to have introduced the arteries would have complicated the drawing too much. Practically the whole of the sensitive foot is scarlet in color, from the amount of blood it contains, and the sole use of this blood is to manufacture the horny covering.

We alluded just now to two plates of cartilage found in the foot; they occupy the position shown in the diagram, and their use is connected with the important lateral movement or expansion which the foot undergoes when weight is placed on it. If it were not for these elastic plates, expansion of the foot would be rendered very difficult. The plates also assist the circulation of the blood in the foot, by exercising, during their elastic movements, pressure on the veins, and thus pumping the blood out of the part.

Perhaps the greatest interest in the foot is centred in the mechanisms which prevent concussion, these are as follows: lateral expansion of the

foot, descent of the vascular within the horny foot, flattening of the sole, and sinking of the heels.

The expansion of the foot has been known for many years, but has always found more opponents than supporters; it was not until the introduction of foot apparatus which was capable of making delicate measurements that it was possible to convince the incredulous. Lungwitz, in Germany, has made some valuable observations on the expansion of the foot. Independently and unknown to each other we were both reinvestigating the phenomenon with improved apparatus, and obtained results which were practically identical. I show you on the screen the apparatus employed by Lungwitz, which consists chiefly of a shoe to which can be fitted an arm carrying a screw. To this arm one pole of the battery of an electric bell is attached; the wall of the foot is covered with tinfoil carefully secured in its place, and to it is attached the other pole of the battery; the contact screw is so adjusted that if the foot widens when the weight is placed on it, the tinfoil touches the screw and so closes the circuit, of which the bell gives the indication. With this and other apparatus Lungwitz investigated the movements of the foot not only at rest, but during work.

I have been unable to investigate the movements of the foot during work, but on the table may be seen a piece of apparatus constructed on the same lines as that employed by Lungwitz, and with it I shall be able to show you, even on the dead foot, that there is marked lateral expansion. There is another piece of apparatus which I have employed, not only to indicate lateral movement in the foot, but to register the amount. The apparatus is constructed on the lines of a well known form of steam gauge; a pin is connected with a series of wheels which multiply its movement, and convey this for the purpose of registration to a hand working on a dial; a very small amount of movement in the pin gives rise to a considerable excursion of the hand on the dial; by dividing the dial into a certain number of parts and carefully estimating their value by means of a vernier, an apparatus capable of registering the  $\frac{1}{16}$  of an inch is readily obtained. I have this instrument on the table; it is placed against the wall of the foot at any desired spot, and, by lifting up the opposite leg, and so throwing extra weight on its fellow, the foot expands. A large number of observations carried out on these lines demonstrated that during rest simply imposing extra weight on one fore foot by lifting up its fellow caused it to expand  $\frac{1}{8}$  of an inch.

It may be asked what is the value of this trifling increase? My answer is that this "give" makes all the difference between a rigid and a yielding mass, the slight yielding saves the foot from jar and concussion. It is obvious that the amount of "give" depends upon the force with which the foot comes to the ground, viz., on the pace, but under no circumstance is it likely to be more than  $\frac{1}{8}$  of an inch.

The only part of the foot which expands is that portion of the wall situated toward the heels.

On this large model I have shown you in section the arrangement of the bones within the foot, and I pointed out the existence of a small but exceedingly important bone, the seat of an incurable lameness. The ques-



tion arises as to the use of the navicular bone. My reply to a rather complex question must be brief—it is to increase the area of the pedal joint. It is obvious that an increase in the area of the joint could have been obtained by making the pedal bone itself larger, instead of introducing a third bone into the joint for the purpose. You will, however, observe from this model that the navicular bone has a movement quite independent of that of the pedis. It gives slightly when I press upon it and then returns to its place. Bearing in mind what I told you early in this lecture, that the heel of the foot comes to the ground first in all fast paces, you will be able to see that this small and troublesome bone really forms a yielding articulation, on to which the first force of impact is imparted, and in this way concussion is prevented. When this bone becomes diseased the animal, as we might imagine, goes on its toes and loses all freedom in its gait.

The next mechanism to be described is the descent of the vascular within the horny foot, a process which can be perfectly seen in this model. The whole of the vascular foot under the influence of the body weight, sinks or becomes depressed within the hoof, to rise again to its position when the weight is taken off the limb; to revert to our original simile, the finger slides up and down within the glove. The amount of this movement is about one-sixteenth of an inch. The effect of it is that the foot offers an elastic and not a rigid resistance to the concussion of impact, and in this way neutralizes the jar which would otherwise be felt, in the same way that it is easier to catch a cricket ball by a retreating movement of the hand than by rigid opposition.

At the moment of the descent of the internal foot, the horny sole, which you will remember is concave toward the ground surface, becomes slightly flattened, as the result of which no bruising of the delicate structures covering the sensitive foot is incurred.

If we place a foot rule in such a position that one arm is resting on the ground, while the other is lying parallel to the wall of the foot at the toe and in this position lift up the opposite foot so as to throw double weight on the one under investigation, it will be found that at the moment the extra weight comes on the limb the upper or coronary edge of the hoof slightly recedes from the foot rule; when the extra weight is taken off the foot, the edge advances into its original place. This phenomenon is associated with a sinking of the upper edge of the hoof at the heels and an increase in the width of the foot.

The change in shape just described follows as the result of a temporary rearrangement in position of the parts within.

We have previously drawn attention to the very vascular nature of the horse's foot; time will not admit of stopping to inquire into the causes of this vascular condition, but what chiefly strikes the physiologist is that a part lying furthest from the heart should be able to have such a complex circulation carried on with comparative ease. Does the foot in any way assist in its own circulation? The experiment which I am about to show you proves this very conclusively, and demonstrates that a pumping mechanism exists, by which the blood is forced out of the foot every time the weight comes on it.

Into the veins of this foot I have placed two glass tubes, and both are filled with water; by projecting these tubes on the screen you will be better able to observe that at the moment I press on the foot joint—and thereby, as you will remember, depress the internal foot and at the same time cause the whole part to slightly expand—the fluid rises considerably in the manometer tubes; when I remove the pressure the fluid falls. Now in the living foot when the weight comes on the limb, the blood is pumped with considerable force up the veins of the leg, and at every movement this is repeated. That the living foot behaves like our dead one, is proved by the fact that if a vein be divided in the living animal, a jet, as if from a syringe, comes from it every time the foot comes to the ground.

The pumping action in the foot is due to the various movements occurring in this organ, and without their aid it is probable that the circulation in the foot would be carried on with extreme difficulty.

Finally, let us briefly pass in review the changes occurring in the foot from the time it makes contact with the ground until it leaves it.

The weight is received on the posterior part of the foot and foot pad, by which means the plantar cushion resting above the foot pad is altered in shape; the foot pad and plantar cushion being compressed and widened, each exerts pressure on the part of the foot with which it is in contact, so that both the wall of the hoof and the elastic cartilages are pressed outward, and expansion of the foot occurs. Concurrently with this the weight has been received on the posterior part of the pedal joint with its yielding articulation formed by the navicular bone. By the time the whole foot is flat on the ground, the entire sensitive foot has become depressed within the horny envelope, the heels of the hoof have sunk, and the coronary edge travelled backward. The body now passes over the foot, the limb revolves as it were around one point, viz., the foot joint, and finally the heels leave the ground, their width becomes decreased, while the final propulsion to the body is given by the toe, which is the last part of the foot to leave the ground.

The hour allotted to this discourse has expired. I have had to take you very hurriedly, and I fear very imperfectly, over a considerable amount of ground, such, indeed, as might have occupied our attention for several lectures, but I trust I have awakened an interest in a very important subject, and that something may have fallen from me which will be of use to you and to that animal to which we are all so much attached.

---

## THE MANUFACTURE OF METALLIC TUBES BY THE BOULET PROCESS.

(From *Le Genie Civil*.)

THE iron and steel tube industry is day by day assuming greater and greater proportions, and is delivering to commerce three categories of tubes called "butt-welded," "lap-welded" and "seamless." Each of these presents qualities of cheapness and resistance, and it may be said that up to the present what one of these has gained in one direction

it has lost in another. The process that we are going to describe has been specially devised for the cheap manufacture of tubes possessing all the strength compatible with the material used in making them.

In order to facilitate an understanding of the matter, we shall briefly recall the processes employed up to the present for giving iron and steel a tubular form.

The butt-welded tube, the feeble resistance of which limits its use to the transmission of liquids and gases under low pressure, and to certain pieces of construction for which the closed circular profile is better than the U or single or double T ones, is obtained by rolling a strip or skelp of metal whose edges are simply juxtaposed, and in passing it through a cone plate whose internal section is slightly less than its external development. This passage is effected in the cold way if a simple juxtaposition of the edges is desired, and at a slightly elevated temperature if a welding is desired.

Certain foreign manufacturers employ skelps with an oblique edge in order to obtain a sort of lapping and thus endeavor to create a confusion with the following products.

Lap-welded tubes are made of skelps with a very wide bevel and are welded by a stronger pressure, usually with rollers, with the aid of a mandrel (B, Fig. 1) designed to render the internal section of the tube regular, and

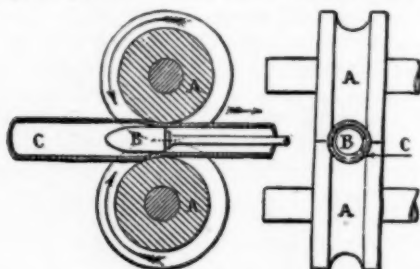


FIG. 1.—WELDING LAP-EDGED TUBES BY ROLLERS.

upon which is exerted the pressure that permits of obtaining an intimate welding. This method of manufacture, however, cannot be applied to large diameters.

The manufacture of seamless tubes can be done in different ways, by means of the direct drawing of an ingot through a plate or roller, the drawing of an ingot upon a mandrel through the repeated blows of a swiftly moving stamp, the drawing of an ingot upon a mandrel by special rollers, and the direct conversion of a solid bar into a tube by the Mannesmann process. Upon the whole, all these methods, except the last, consist in drawing out an ingot, and the main thing is the preliminary manufacture of the latter, which should be long and relatively thin.

Drawing by means of the draw plate, the method most employed, is done with the aid of a mandrel (Fig. 2) designed to limit the annular space that allows passage to the tube when it is desired to give the latter considerable thinness. Such thinness, however, is limited by the necessity of

allowing the tube to retain sufficient resistance to permit it to support the traction that it must be submitted to during its passage through the draw

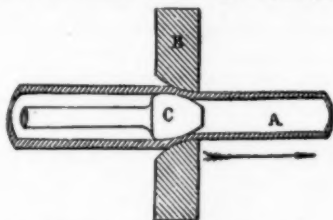


FIG. 2.—DRAWING OF A LAP-WELDED TUBE.

plate. Such traction has the inconvenience of diminishing the resistance of the tube to internal pressure. This process is lengthy, but gives a finished product.

Mr. Palmer has proposed to substitute for the ordinary stamping matrix the grooving of an apparatus formed of several rollers whose axes are in the same plane (Fig. 3, Nos. 1 and 2). If these rollers have a circular section, the grooving acts nearly like that of ordinary rollers; but if the section has the form of a spiral, *a b c d e*, the development of the apparatus during its revolution will become a cone. And if to this grooving there be presented a conical ingot mounted upon a conical mandrel, the ingot will always elongate in the form of a cone. But it is possible also to give a strong pressure, and, consequently, to obtain a rapid drawing. The conical form of the mandrel permits of easily removing it from the tube after the operation. This method is very efficacious, but its practical limit is soon reached, because the rollers draw so much the worse in proportion as their diameters are greater.

In 1888 Mr. Boulet proposed the following improvement of the Palmer method. In order to suppress the inconvenience due to the fact that the friction becomes very great when, in order to render the drawing energetic, we increase the diameter of the rollers and their axes, he substitutes sectors, *A* (Fig. 4), for the rollers. This permits him to obtain a great length of axes of rotation, *B*, and to reduce their diameters. In closing with wedges the spaces left free by the sectors, *A*, we obtain a stamping matrix capable of working like the ordinary ones, and that offers the peculiarity that when the ingot, thrust by the mandrel, reaches the line of the axes, the stamping, if the sectors are rendered loose, continues, and there results a true flattening of the edges of the ingot between the mandrel and the sectors. This method of stamping is rapid, but is limited by the development of the sectors. In order to prolong it, one may substitute sectors of helicoidal section for those represented. In this way, the development is infinite, but it is necessary to reduce the number of the sectors to three or four. The length of the ingot remains always limited, for there is a friction between it and the mandrel upon cooling, and the removal becomes so much the more difficult, despite the conical form of the mandrel and the reheating of the ingot, in proportion as the latter is longer and thinner.

The drawing of tubes in all kinds of rolls is rendered more efficacious by striating the surface of the groovings, but the tubes then present projections which are effaced only by several passages, under feeble pressure, through smooth groovings.

In 1852 Mr. Muntz conceived the idea of making tubes by presenting an ingot of circular section to the ordinary groovings of rollers for solid pro-

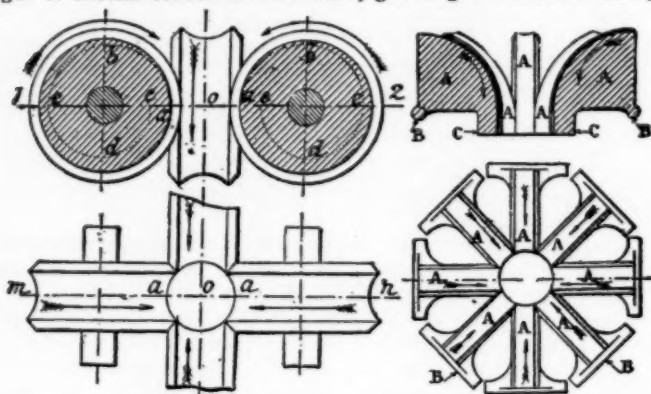


FIG. 3.—ROLLERS FOR SHAPING.

FIG. 4.—ROLLERS WITH SECTORS.

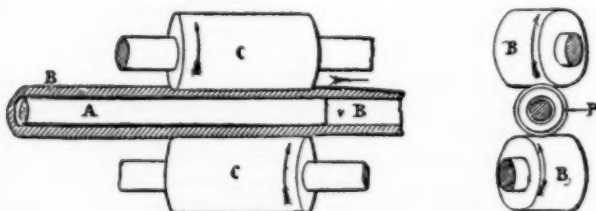


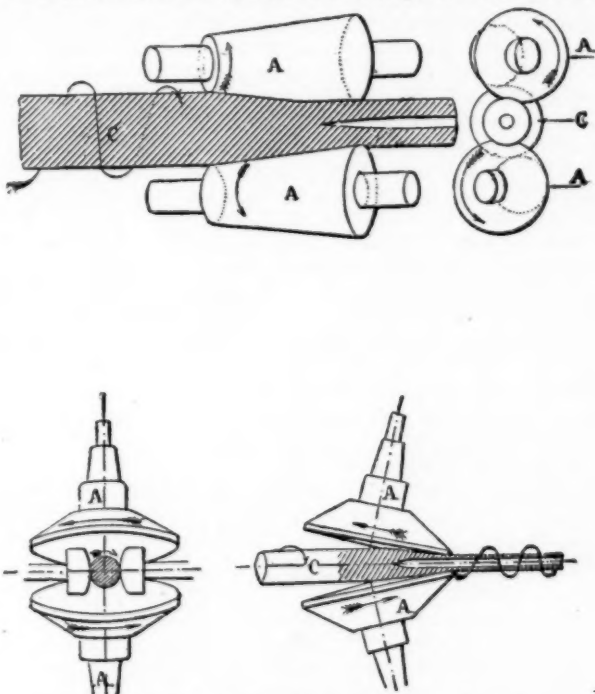
FIG. 5.—SELBY ROLLERS.

filed bars. This ingot takes the form of a strongly flattened tube, and nothing remains but to open the latter by means of a mandrel or of hydraulic pressure. But, during this operation, cracks occur, and this is the cause of considerable waste.

In 1854, Mr. Selby proposed the following apparatus: A mandrel, A (Fig. 5), fast or loose, and an ingot, B, are placed between two or more cylinders, C, whose axes are oblique with respect to that of the mandrel, and so arranged that the distance of each of the cylinders from the mandrel shall be less than the thickness of the ingot, B. The latter advances upon the mandrel in becoming thin. An endeavor has been made to give the cylinders the form of cones, paraboloids or hyperboloids of revolution, loose or fast; but the following difficulty has always been met with: the

mandrel, A, becomes heated, and its contact with the ingot cannot be prolonged.

From a certain point of view, the Mannesmann process is a derivative from the preceding. Mr. Boulet finds the theory given by Mr. Reuter to explain the operation of it inadequate. According to him, the essential cause of the formation of the aperture by the Mannesmann rollers is the following: If we hammer the surface of a metallic cylinder, even as regularly as possible, there soon form in it small fissures that converge upon the axis. This granted, let us suppose that A A (Figs. 6 and 7) be two conical



FIGS. 6 AND 7.—MANNESMANN ROLLERS.

rollers arranged obliquely with respect to each other and revolving in the same direction and with the same velocity. As soon as the bar, C, comes between them, the above effect is produced. The breakage once determined, if the profiles of the cylinders are such that the distance apart of their points of contact with the bar becomes progressively greater, there is no longer a drawing of the latter. In measure as it revolves, its section, first flattened by the cylinders, becomes rounded, and, as the surface circumscribed by its perimeter increases by the same stroke, the space widens in the centre of this mass without sensible internal resistance. If the



pressure of the cylinders continues, the walls of the tube laminate it one against the other, and the section takes the form of a figure 8. Finally, when the receding of the cylinders permits this buckle to convert itself into a ring, we obtain a tube with a central aperture so much the wider and with walls so much the thinner in proportion as the laminating of the buckled section has been carried further. In the Mannesmann process use, moreover, is made of a mandrel capable of turning upon its axis, and which is thrust against the tubular part already formed.

However it be with the explanation that he proposes, Mr. Boulet's objection to the Mannesmann process is that it requires so great a motive power that it has been necessary at times to carry the latter to 2200 horse power. The rollers revolve to no effect for a certain length of time in order to accumulate their live force in a series of fly wheels whose velocity and weight are such that the work accumulated for the passage of a tube represents, according to Mr. Reuleaux, as much as 14,000 horse power. The velocity of the mandrel is such that an axle out of true has been wrenched from its journals, thrown through the roof, and fallen at several hundred yards from its starting point. It is, on an average, 2800 revolutions a minute. As, in addition, the cylinders have to be of quite small diameter, the material of which they are formed must work considerably. Under such conditions, Mr. Boulet estimates that the keeping of such an installation in repair must be burdensome, that the running of it must be dangerous, and that the service must require picked men. It is for all these reasons that he has thought it well to seek a new, less laborious and more economical process. The one that he has devised has not as yet been submitted to any trial, and so long as it has not been sanctioned by experience, it will be impossible to pronounce upon its value. Since, however, it is the work of a man experienced in the practice of metallurgy, it is of interest to know something about it.

It consists in making in the body of the solid bar from which it is desired to form the tube incisions, such as a, a, o a (Fig. 8), the lips of which

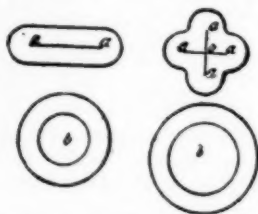


FIG. 8.—INCISIONS MADE  
IN A SOLID BAR.

are forced outwardly, and, through the extension of these slits, passing to the tubular form. Since in opening these slits one has recourse to a sliding cut, which evokes on the part of the metal a resistance much less than the traction, Mr. Boulet estimates that this method of piercing will require much less work for obtaining the tubular form than the drilling of a

solid body by means of a tool traversing it, and that, in addition, the metal will experience much less strain.

The tool proposed for making the slits, *o a* (Fig. 8), is a sort of punch (Fig. 9), whose cutting edges, *a* (sections 3-4 and 5-6), are so arranged as to push outwardly the lips of the slits that they form, and so that the deeper the punch enters the mass of the body, the wider the opening becomes, until it reaches the dimensions determined by the sinuous line, *uVuV*. This tool has three pieces forming a matrix of uniform circular section save in its upper part which is widened into a truncated cone, so as to allow the bar, placed in the matrix, to oppose an energetic resistance to sliding when it is attacked by the punch. The latter is firmly set and is thrust against the bar which it penetrates until its setting comes into contact through the metallic lining and forms a tight joint. At this moment, the punch ceases to advance into the bar; but if, through a channel, a fluid under sufficient pressure is made to enter, it will resume its travel and the tube will form. In fact, says Mr. Boulet, the junction of the cylindrical part of the punch with the cutting part is effected through the undulating line, *uVuV*... (Fig. 9), of a diameter greater than the cylindrical part. It results that the

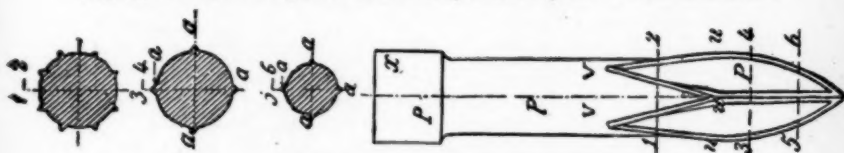


FIG. 9.—BOULET PUNCH.

fluid, passing around the latter, reaches the line, *uVuV*... and exerts its pressure upon the walls of the tube in course of formation, which it presses strongly against the matrix. Now, the friction that the sliding of the tube would necessitate if it had to break according to one of its sections, situated with the line *uVuV*..., would be stronger than the resistance of the metal of the tube itself, so that such breakage is possible only according to *uVuV*... But this line may have a development from four to ten times greater than the straight section of the tube, and therefore permits of an action from four to ten times greater than an extension by the draw plate. Moreover, such resistance may be utilized in the traction of the sinuous line almost to breakage; for, although the metal is altered by the excessive traction that takes place at the time of its passage under the sinuous line, it is immediately regenerated by the energetic pressure of the fluid that compresses it—that forges it in a word, against the matrix at a pressure often greater than 3000 kilogrammes per square centimetre, while drawing through the draw plate is limited to the charge not altering the elasticity of the metal treated.

When the tube is formed, it is taken from the matrix after the pieces have been removed by their lower part. The apparatus in which the preceding manufacture should be effected is represented in Figs. 13 to 15. It operates as follows:

Let us suppose that the motive fluid admitted into the cylinder, I, be

water under pressure, that the fluid introduced into the cylinder, *r k l*, also be water, and that, at *Z*, there be compressed air. The figures represent the apparatus as we find it at the end of an operation—all the distributions closed and the press at rest. In order to begin another operation, let us

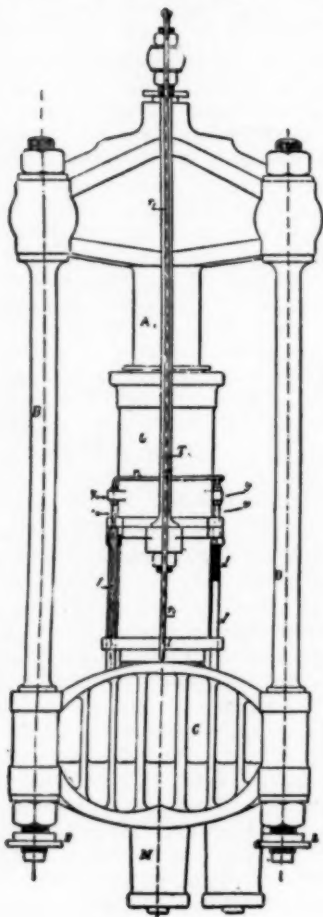


FIG. 13.

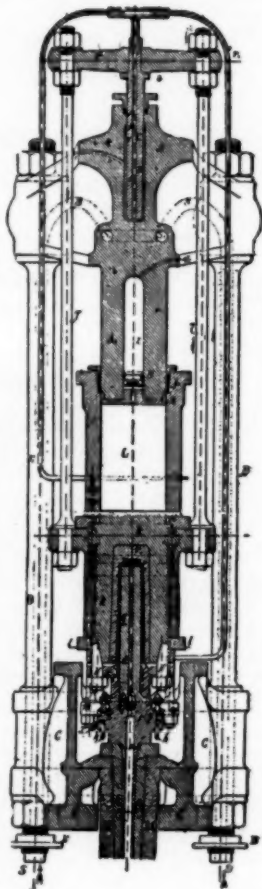


FIG. 14.

DETAILS OF THE BOULET APPARATUS—ELEVATION.

follow the communication of the cylinder, *L*, with the external air. The piston, *D*, which always communicates with an accumulator, being no longer retained by the pressure of the water stored at *L*, ascends and carries the

cylinders, L and r k l, with it. When all this ensemble is high enough, let us close the discharge distribution and open the communication of the tubes, r, with the bottom of the lining, q. The water traverses the latter, and, as the channel, s, is obstructed, exerts a pressure upon the piston that causes it to descend until the nuts of the bolts, J (fixed to sockets, m, cast in a piece with f and sliding in the sockets carried by the rings, l), arrest it at the point where it is desired that there shall be the proper quantity of water in the cylinder, r k l. Two diametrically opposite bolts are hollow in order to serve as cylinders to plungers, b, which are themselves hollow and fixed to lugs, y, cast in a piece with L. In this way, the water entering through  $r_1$  passes into these cylinder bolts and repulses the piece, f. If we consider the instant at which the piston, d, is at the bottom of the cylinder, r k l, before the charge of water is introduced into it, the receding of the pieces, f and d, determined by the thrust of the pistons, v, permits of the introduction, between the pieces, e and  $e_1$ , of an iron plate or membrane of proper resistance. But the receding of these pieces, f and d, is limited by the pistons, L, fixed at d (Fig. 14). As these pistons slide in cylinders, g, fixed at f, and as the cylinders, g, are in communication, interrupted at will, with the cylinders J, though the pipe, x (Fig. 14), carrying a distributor, as soon as we put the cylinders, J and g, in communication, the piston, h, being larger than the plungers, v, the piece, f, will approach p and make a solid joint of the channel, s, through the plate or membrane introduced between e and  $e_1$ . When this joint is made between f and d, the quantity of water necessary for the operation may be introduced into the cylinders, r k l.

These arrangements being made, let us introduce the punch, P, into the

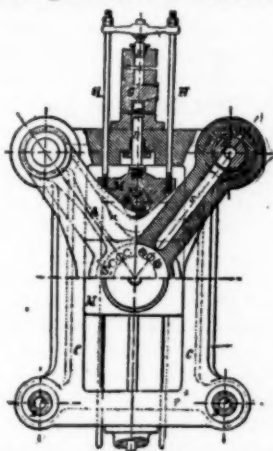


FIG. 15—DETAILS OF THE BOULET APPARATUS—PLAN.

piece, f, and put one of the matrices, M, containing the bar, b, under the press, and let us open the low pressure distributor. The water will rise through the column, B, whence it will pass into the arm of the piece, A,

through the conduit, S, then into S<sub>1</sub>, and thence into the cylinder, L, through the apertures, t (Fig. 15). The cylinders, L and r k l, will descend through the pressure of the water, whose tension is sufficient to cause the punch to penetrate the bar. When the piece, f, is upon the point of meeting c, an automatic mechanism arrests the introduction of the water under feeble tension and establishes that of the water under high tension.

The water contained in the cylinder, r k l, therefore supports the entire power of the press, and this abrupt tension causes the joint, e and e<sub>1</sub>, to cede, so that the water contained in the cylinder, r k l, immediately thrusts the punch into the bar, into which it makes its way in forming the tube. When the latter is to be removed, it is well (since the expulsion of the punch under a pressure that often exceeds 3000 kilogrammes per square centimetre would inevitably injure it) to arrest the introduction of the water into the cylinder, L, and to open the communication with the compressed air contained in the chamber, Z. This air is isolated from the water of the cylinder, L, by the piston, N, movable in the chamber, Z, which drives beneath it the water contained in the cylinder, L. The latter thus continues its descent with a progressively decreasing yet sufficient force to expel the punch. After that, all that remains to be done is to remove the tube from the matrix. It is useless for us to say that a tube already formed by a preliminary operation can be drawn by a second of the same kind.

Such, in its broad lines, is the Boulet process. We terminate this description in recalling that it is well, before pronouncing upon its practical value, to await the result of the trials that are to be made with the installation in course of construction, and in which the late Mr. J. Mignon and Mr. H. Rouart have given the inventor valuable assistance. While hoping that these trials will prove a success and provide French industry with a very useful process, it is impossible not to remark that the new apparatus constitutes quite a complicated whole whose operation may present serious difficulties.

## THE ROYAL MILITARY RIDING INSTITUTE IN HANOVER.

(From *Illustrirte Zeitung*.)

**F**AR from the centre of the old Guelph city, in the suburb called "Vahrenwald," lies the barrack-like building occupied by the riding school, from the north wing of which the outskirts of the Lüneberger Heath are visible in the dim distance. The part of the structure which fronts on Vahrenwalder Strasse contains the offices, the barracks for privates, orderlies, etc., and also quarters for non-commissioned officers and a few of the officers; and the wings surrounding the large court contain the stables and covered tracks. The open air tracks and jumping gardens, which have been raised so that they may be more easily kept dry, extend almost around the large court. During the rainy fall and winter months the drill is usually performed in the inclosed tracks. By just walking through the court the military character of the work will be

understood ; here an officer just released from duty is trying to control his fiery horse, which in its young strength can hardly brook the tiresome rules, there another spurs a less spirited animal, forcing it to take the two yard ditch or jump over the dreaded stone wall.

Let us turn to the stables; from the number of single stalls and the size of each, one can form an idea of the amount of space and material of all kinds required for the instruction of more than two hundred men. Each Prussian, Saxon and Wurtemberg cavalry and artillery regiment has a lieutenant, and each cavalry regiment of these states has a non-commissioned officer here, as a pupil. Any one who has seen a stable belonging to the German cavalry or artillery will not be surprised at the scrupulous cleanliness of this arched building; but it is true that these stalls, which were fitted up twenty years ago, have not the comforts of modern stables, as regards light and air. They are all so arranged, however, that the horses can be taken back to their stalls after going through with the exercises in the closed tracks—during which they become very much heated—without passing through the court, and they await their turn, all bridled, in cold stalls.

The object of the two years' course in this riding institute is to provide competent and properly instructed "Stallmeisters" for the army. The lieutenant pupil must not only become an excellent horseman who sits firm in the saddle, but he must also be a connoisseur of horses from the theoretical point of view, and a reliable teacher and trainer or breaker of horses. It is understood that the duties and service by which a few selected teachers are to make experienced riding masters and staff officers of the pupils must be comprehensive and severe. The officers, in the first year's class, ride the trained horses belonging to the institute, as well as their own horses and the chargers brought from the regiment. These trained horses are perfectly broken, and on them the new men have to begin over again, learning the prescribed manner of sitting, the proper way of influencing the horse, and much more that is included in the course of instruction. The chargers, which are generally young, are used as objects from which the men are given lessons in breaking and training horses. The men in the second year's class ride young chargers and older ones that are partly trained, their own horses, and the trained horses of the institute. The crowning glory of the horse is a thorough knowledge of horses, theoretical as well as practical. It is hardly necessary to say that everything is arranged for the systematic advancement of the rider and the horse. In order to make instruction as fruitful as possible for individuals, each class is divided so that there are never more than twelve men in a division. From nine o'clock in the morning until five in the afternoon, the whole school presents a scene of great activity.

If one not versed in such matters should pass through the school, he might think he had seen a succession of circus feats, when he came upon a division of officers practicing difficult jumping and other parts of the drill; but in that one case he would be reckoning without the school training, for the Alpha and Omega of this part of the service is instruction in riding, which, like every method of instruction, breathes of pedantry and monotony.



The strict teacher stands quietly in the centre of the track, never turning his eyes from the figures that are circling about him ; he has a word of correction for each one, calling attention here to an improper way of sitting on the saddle, there regulating the distance between them, here to the way the hands are held, and there again criticising the gait of a horse. In this way the instruction proceeds, and this conscientious dry track work is much harder for the men than miles of rapid riding in the open air ; the bodies and nerves of the men, most of whom are older second lieutenants or younger first lieutenants with many a year of service before them, are on the strain. This will be understood by one who knows what it means to spend hours of each day on the back of a horse and at the same time pay strict attention to the instructions of the teacher. For years past this severe pedantic method has produced the best results, making the Hanover Institute celebrated all over the world, so that foreign countries are glad to avail themselves of permission to send an occasional officer to be trained in this school.

The curiosity of the outsider will find the most satisfaction in the tracks. The breaking of the school horses, both with a leader and without, will give a little idea of the difficulties with which the trainer has to contend. In the middle of the track are two posts placed about one and a half yards apart, between which the horse to be trained is held by halters. While held thus to the spot the four-footed scholar is taught the correct postures, the proper placing of his feet, in short, every particular of the behavior required from a perfectly trained saddle horse, and all this forms also an object lesson for the officer pupil.

## Military Notes.

---

### WAR WITH THE UNITED STATES.

WHAT is done cannot be undone. President Cleveland, either recklessly as an electioneering move, or with determined counsel, has drawn aside the veil and disclosed to the British eye not the face of a kinsman, such as we all expected, but that of a rancorous enemy ready to seize on the smallest pretext for picking a quarrel with us. In the United States that countenance may possibly have been theatrically made up. It may be that the horrible tyranny of democracy can allow no one to speak his mind unless he has a courage not as that of other men. It may be that the feeling disclosed was not real; was a part of that great governing shadow cast by no one knows who, a mere shadow in that garb of solidity which the awe-stricken citizens of a democratic State obey.

But the point is, that whether the sudden outburst of hostile feeling towards this country was real or unreal, theatrical or natural, that is the feeling with which we have to count. That is what will dominate in the United States and direct her actions towards us in the future. She cannot escape from its directing force, any more than we can from its consequences, unless she submits herself to revolution and break-up. It may be true that as far as the immediate question is concerned, things can be smoothed over. The pretensions put forward by Mr. Cleveland to Congress may not have been communicated to our government—may not be official, in short, as far as we are concerned—and therefore must pass unnoticed by us. The United States Commission may declare that our determination to withhold a certain tract of what we assert to be British Guiana from arbitration is as much justified as would be our refusal to submit the nationality of the site and buildings of George Town to the consideration of the same tribunal. America may get out of it that way.

Every Englishman, however, now knows, and can never again forget, that the United States propose to dominate in America, and are hostile to us because we are the chief bar to such domination. And yet her position is a ridiculously absurd one. She claims, in effect, that all our interests in America must give way to what she thinks hers, in order, chiefly, that she may be exempted from those charges for armaments which weigh so heavily on the powers of Europe. She does not perceive that neither nations nor men ever surrender their vital interests to others unless compelled by force. *To live as she now does, free from any great cost for armaments, she must behave as she has hitherto done, and keep herself to herself. She is a numerous and fairly wealthy nation, but she is a great nation—in the sense*

*of power in the world—only by sufferance.* There is a general European understanding with her that the States on this side of the Atlantic will not attack her interests in America, but it is mutually agreed that she shall not attack European interests anywhere. The moment she announces her intention of acting like an armed nation and breaking the compact with Europe, she becomes ridiculous in the face of the world if she does not make those sacrifices in the way of armament which European nations are compelled to do, and which she would in any case have been compelled to do had Canada remained French. Having, by a great public act, condoned and supported by a great manufactured or spontaneous burst of feeling, committed herself to the position of an European power and claimed to be great, not on the ground of new political light and a basis of good will, maintaining friendly negotiation through all international difficulties, but on the ground of self-assertion and a claim of right not to be questioned, she will be forced to do as other nations do. She will be compelled to maintain an army and a navy adequate to her pretensions.

The prospect is sufficiently melancholy, but we must understand that if the United States remain united there will ultimately be war between the British Empire and that nation. The world learns nothing; and the latest creation in the form of a great power drifts—in spite of all the better knowledge of its wiser citizens—into the position of the oldest. For this empire, it must henceforth regard war on the United States, however we may deprecate it, as one of the probabilities. At present, perhaps, the mere instinct of an excitable people might check them before they went too far. For it is absurd to suppose that any of her statesmen with common powers of reasoning and an influential position would hesitate to speak his convictions before an irrevocable step was taken. However defective our army organization may be, it is difficult to conceive that we could not have 200,000 men on the Canadian frontier long before the United States could train and equip 50,000. Mexico in the south would scarcely fail to seize her opportunity; and an all-pervading British fleet infesting the Pacific and Atlantic seabords would only complete a second edition of that "Anaconda" policy which the Federals employed with such complete success in the Civil War. The effort on both sides would be gigantic, ruinous, and beyond imagination a criminal folly on the part of the power which forced it on.

Unless all the preachings of all the experts for the last twenty years have been but sounding brass and tinkling cymbals, the country which was best prepared would win. The British army—unless all our modern efforts have been futile—and the British navy would not only be first in the field, but the general position of the United States and Great Britain at war would be strikingly analogous to that of China and Japan. Japan was ready, and China had made no real preparations. England is ready, and the United States are in no way ready. China, an apparently homogeneous nation, is in reality but an assemblage of nations, only holding together because there has never been any advantage in separating. There has never been an outside pressure upon her such as to make separation the interest of any of her parts. This is so much more true of the United

States, that even without such outer pressure, one-half made a fierce struggle to shake itself clear of the other half. The concentration of Japanese power manifested its success against the diffusion of Chinese power, and it is not reasonable to doubt that English concentrated power would do the like against the devolved and diffused power of the United States.

An inflated patriotic sentiment has never held out very long unless material advantages were behind it. The pressure of war upon the North, South, East, and West of the United States would scarcely consolidate those huge quarters of an unwieldy group of nationalities. For it must be borne in mind that the United States have not been long enough united to produce a strictly amalgamated race. There are millions of American citizens who are only such by law, and have no real "American" sentiment. The inertia of these divergent races in the midst of the States might easily raise anew the cry of State rights, and paralyze the central executive. On the whole, we may for the present hope that the sensible men in America who have allowed themselves to be carried away by the flood, will reflect that the result of war might be too disastrous to the United States to be contemplated for a moment. But for us, we must wait and watch. If the armament of the United States grows, we shall understand that the sensible men cannot stop the rolling of the democratic ball, and can only prepare it to crush as it rolls. Then we may be sure that a terrible time of trial has come, and that we must nerve ourselves and prepare to meet it.—*From the Broad Arrow, England.*

#### THE AMERICO-CANADIAN FRONTIER.

There is not wanting evidence that notwithstanding the unjustifiable threats and pretensions of President Cleveland, there will be no war between the United Kingdom and the United States. As, however, this country is resolved not to submit to bullying by any power, the best way of preventing threats developing into actual aggression, is to show ourselves capable, if need be, of defending our material interests, and of vindicating our honor. Besides, with a country on our frontier liable at any moment for purposes of party, to take up a hostile attitude, it is desirable that we should consider what the strategical position of the Dominion of Canada is, irrespective of the present difficulty.

At the first glance the map discloses an apparently very weak frontier. The border line, about 4000 miles long, runs from the mouth of the Fraser River due east till it strikes a point on the northwest shore of Lake Superior, a little south of Thunder Bay. Thence it is defined by Lake Superior, Lake Huron, Lake Erie, and Lake Ontario. From the northeast corner of the latter it runs along the left bank of the St. Lawrence to St. Regis, and then for 167 miles along the 45° parallel of latitude to the Connecticut River. From that point it describes an irregular curve enclosing the greater part of the State of Maine, and bringing the latter at its most northern extremity within twenty-five miles of the St. Lawrence at Rivière du Loup. From the end of the eastern arm of this bight it runs a few miles due east till it strikes the Bay of Fundy. The great defect of this frontier is that owing to the unfortunate Ashburton Treaty the State of Maine runs

like a wedge into our territory, and as we have just said, approaches at one point to within twenty-five miles of the St. Lawrence. In Maine, therefore, forces might be collected which could within a mile or two strike the railway which runs from St. Andrews to the St. Lawrence at Rivière du Loup, and in the other direction via Moncton connects with the railway from Halifax. Fortunately, however, there is from Halifax another branch, which passing through Newcastle, strikes the St. Lawrence at Melis, and then runs along the south or right bank of that river. Until it reaches Rivière du Loup it is too remote from the frontier to be in danger from a mere raid. The east and west railway communication is also liable to be severed by a party landing from a steamer on Lakes Ontario, Erie, Huron and Superior. No doubt, however, we should soon have a fleet of gunboats on the lakes, and much would depend upon the result of a contest for the naval supremacy of the inland waters. Moreover, it must be borne in mind that if railways can be easily cut they also afford means for rapidly bringing up defenders to the threatened spot, and that cutting railways can be practiced by both antagonists. Moreover, behind the main line, running from the Atlantic to the Pacific, and covered by the St. Lawrence, there are many other lines. In addition also to the main lines of railway and water navigation there are shorter supplementary lines of both sorts of communication which lead from the interior towards the frontier. The frontier lying west of Lake Superior does not at present call for much attention for several reasons. That part of the Dominion is, comparatively speaking, a desert, and like a great portion of Russia has no centres. A small force could easily be dealt with by the mounted police and the local militia, or by troops sent from either the east or the west by means of the railway. No large force would dream of making an incursion. It could be nothing more substantial, owing to the difficulty of obtaining food; hence for several years to come we may almost dismiss from consideration the western half of the Dominion.

With regard to the eastern portion of the frontier, the advantage to the Americans of possessing Maine, which projects into our territory, is more apparent than real. Maine, owing to the nature of the country, is not formidable. It is rugged, covered with forest, thinly populated, and possesses no railways running north and south. An attempt, therefore, to invade Canada by that seeming sallyport, unless there were strong coöperating armies on each flank, would lead to the enemy putting his head into a noose. From each end of the base of the triangle small forces would be able to intercept the invader's lines of communication and food supply, whilst a large force could by means of the sea, inland waters and railway communication be rapidly placed so as to compel surrender. Without going into details our proper policy is to adopt measures for rapid mobilization and concentration; to strongly fortify certain important points; to avoid dissemination of troops along the frontier, which should be carefully watched by small patrols of mounted rifles and cavalry, and to await the first move of the enemy. That move, to be of any importance, would require long preparation, and would give us time to ascertain the intended direction of the blow.

It seems to be forgotten, if war with the United States should be forced upon us, that we should not confine ourselves to the passive defensive, and that whilst the Canadian forces were being organized and guarding the frontier, an imperial force could throw itself on the eastern flank of the enemy's mustering forces. Fifty thousand regular British troops, landed either on the coast of New Hampshire or Maine, would exercise a paralyzing effect on the movements of an intending invader; but as a war between America and this country would be a duel *à outrance*, we should not confine ourselves to 50,000 men. We should, by calling up the reserve, be able to send a force of 100,000 men to the coast of America, besides contributing some 20,000 men to stiffen the Canadian militia. Hence, though there is every reason why we should forecast a possible, let us hope not a probable, future, and make careful preparations, there is little reason for being despondent as to the result of a war with the United States. Everything depends, however, upon our having the command of the sea, and as to this there should not be a shadow of doubt.—*From the Broad Arrow, England.*

## COLUMBIA ARMY BICYCLES.

Epochs in civilization are usually marked by some great industrial achievement. The locomotive, the steamboat, the telegraph, the telephone have all revolutionized conditions existing at the times of their introduction. None the less deserving of a place in this category, however, is the bicycle, especially the modern safety, while the variety of uses to which it is capable of being adapted were never dreamed of by its most loyal adherents of a few years ago.

The great centre of attraction at the New York Cycle Show, held early in January, was the Pope Manufacturing Company's exhibit, wherein was displayed the bicycle as adapted to practical army use. An ordinary







Columbia tandem, known as Model 43, and a single machine, or Model 40, equipped for service, did more to illustrate to the popular mind the practicability of the bicycle for war purposes than any amount of dissertation could have accomplished.

Colonel Pope, himself a veteran of the late war, has always taken a deep interest in army affairs, and it is not in the least surprising that a combination of his experience in actual warfare and bicycle building, should be productive of something extremely practicable.

These machines are equipped in the most thorough and complete manner, and yet without carrying an unnecessary ounce, or interfering in any way with the rider or riders. The tandem is finished in the regulation manner, with enamel frame, nickel handle bars; in fact, an ordinary machine taken from the regular stock. On either side of the steering head are attached steel enamel gun rests, lined with leather, into which the barrel of the gun snugly fits, while similar rests are attached to the main uprights to hold the gun stocks. The two guns are Colt's twelve shot repeating magazine carbines, and are so placed as to be always ready for instant use. On the right side of either seat-post are strapped two of Colt's regulation six shooters, encased in holsters in such a way as not to interfere in any manner with the riders' movements. On the same side, attached to the steering head in front, and the lower centre tube in the rear, is a jointed flag-staff in a neat brown canvas case, designed for signal purposes. To the front handle bar are securely strapped two tightly rolled blue regulation army overcoats, while on the rear bars, similarly strapped, is a pair of double gray army blankets. One of the most striking features is the ingenious manner in which everything is attached so that the riders can mount or dismount with the greatest ease.

The single wheel is also built in the regulation way, but presents an even more formidable appearance than the tandem on account of its having at-

tached and ready for action a vicious looking forty-pound gun. This is supported by an extra piece of steel tubing, running perpendicularly from the fork crown to the height of the handle bar, making a "V" shape frame, with two curved pieces of steel projecting upward to receive the gun, but divided midway to admit of the formation of a turn table. The gun is accurately balanced so that it may be easily turned in any direction; and while so adjusted that it can be fired at any angle it does not extend far enough back to cause the rider any trouble in riding or steering. In fact, it is always ready for use, whether riding fast or slow, over bad roads or good.

The gun itself is known as the Colt Automatic Gun, of the kind recently adopted by the navy. It consists of a single barrel attached to a breech casing containing the mechanism for charging, firing and ejecting. It is automatically fed by means of cartridge belts coiled in boxes readily attached to the breech casing. The boxes contain two hundred and fifty or five hundred cartridges each, and are so constructed that they may be easily attached or removed.

In a recent test for accuracy at two hundred yards, one hundred consecutive hits were made in sixteen seconds, demonstrating the rapid action of the gun. The additional weight of forty pounds does not cause the bicycle to steer hard, nor does it interfere with the balance or comfort of the rider.

In this connection it may be stated that the War Department has recently decided to test the bicycle thoroughly for army use, and advertised for proposals for furnishing five bicycles for the purpose. Bids from fifty to eighty-five dollars were put in by makers who usually charge from eighty to one hundred dollars for their machines. The manufacturers of the Columbia, however, claim to maintain their prices at all hazards and put in their bid at one hundred dollars, which was accepted. The experts who made the choice decided that Columbias were worth every dollar of the one hundred dollars asked for them.

#### THE RESISTANCE OFFERED TO PROJECTILES BY MATERIALS USED IN CONSTRUCTION OF FORTIFICATIONS.

The penetrating power of projectiles is constantly increasing in even greater ratio than calibre and range, and the damage caused by the first shock of impact is succeeded by the much greater effects of the explosion. The need for increasing the resisting power of shelters has led to long and expensive experiments. A careful record should be kept of those not secret until detailed tables can be constructed, giving for all the fire-arms of each country the effects produced at different ranges and against the various materials and constructions opposed to them.

The following is a brief sketch of trials made in Holland in 1890 at Schoorl near Alkmar.

Three kinds of projectiles were used: 1st.—21 cm. steel mine shells weighing from 150 to 160 kilograms, containing 21 kg. of gun-cotton or 23 kg. of Bellite, fired from Krupp mortars 7 calibres (1.47 m.) in length. The elevations varied from 50° to 68° and the initial velocities from 180 to 190 m.

2d.—Steel cannon shells, 15 cm., weighing 34.6 kg. containing 1.75 kg. black powder and fired from guns with a length of bore of 3.6 metres. The striking velocities were about 400 metres.

3d.—15 cm. steel battering projectiles weighing 38.7 kg. fired from the same guns.

The two first series of experiments were made against arches or casemates of different forms, and vertical walls. The masonry of the arches, between 2 and 3 metres thick, was ordinarily composed of a mixture of brick and cement, and above, a thick layer of granite and cement concrete. The interior surface of the vault was provided with an iron plating, 1 cm. thick to protect it against the action of fragments. In some cases the mantlet of concrete was placed upon a cushion of sand.

The nine shells were fired at a range of 348.5 metres and produced craters from 40 to 50 cm. in depth; but in order to overthrow the arch, 10 mine shells were required, 8 charged with gun-cotton and 2 with Bellite. It is remarkable that the sand cushion instead of weakening the violence of the blows, seemed, on the contrary, to help along the disintegration of the solid portion and bring it about more quickly. The same phenomenon was repeated when battering shells were fired against a vertical wall protected by concrete. Only three shots were required instead of ten.

The common and battering shells were fired at a range of 500 metres. The revetment of the vertical walls was generally 2 metres in thickness, composed partly of bricks alone, and partly of a concrete of cement and bricks. A few common shells sufficed to overthrow the brick part, but several battering shells, while breaking up the revetment, did not clear it out of the way. However the space in rear would have been untenable from the fragments of shells and masonry.

On the crown of the arches, freed from the protecting mantlet, shells were exploded, in some cases there being a covering of 3 metres of sand, and in others this covering being absent. The explosion of 3, 5 and finally 6 shells did not break down the arches sufficiently to render them unserviceable as shelters. As for the covering of sand, it apparently had no effect.

In a third series of experiments against networks of iron wire with 21 cm. mortars, it was found that the simplest networks were the best and that the damage inflicted was entirely local.

Finally, the same shells fired against sand dunes produced craters from 1.25 to 1.8 metres in depth with a diameter from 4 to 6 metres. A second shell did not change the crater as it was partly filled by sand falling in loosened by the explosion.

Delay action fuses gave smaller results in this last case than instantaneous ones, while just the contrary was found to be the case against solid structures.

If a concrete was used composed of 1 part cement, 1 part sand and 2 parts stone, a capping of this of 1.5 to 2 metres on the arches, according to height, was sufficient to protect them, and the same thickness of revetment protected vertical walls.

These results seem to conform in many respects to those obtained in Austria. These were, briefly, as follows:

The projectile used was the 21 cm. bomb, corresponding to the Holland mine or torpedo shell, except that it was fired at 2750 m. instead of 3485 m. It had already been determined from previous trials that, fired from a piece five calibres in length under an angle of  $60^\circ$ , the bomb had the following penetrations at 3000 metres: 7 metres in earth, 4 metres in sand, 3 metres in coarse gravel and pebbles and 2 metres in broken stone.

The masonry of the arches was of ashlar and Portland cement, 70 to 90 cm. in thickness, or of bricks and a mortar made of lime and cement, with cappings composed of ashlar, sand, concrete, cement and earth in varying proportions of a total thickness of from 3 to 4 metres. Sometimes blocks of granite or iron plates 6 cm. thick were used reducing the total thickness to about two metres. The depth of the craters varied according to the hardness of the materials used, but without exceeding 2 metres in the least resisting materials, and 25 cm. in the hardest.

In two experiments bombs were exploded upon the outer surface of uncovered arches. While inflicting considerable damage, they did not open the inner surface. But in operating upon thinner arches, from 1.74 to 1.24 metres concrete with tufa wedge stones, the whole was burst open.

15 cm. shells fired at 2000 metres did not penetrate arches 1 metre thick composed of Portland concrete mixed in the following proportions—1 part cement, 1 part river sand, 1 part round gravel and 4 parts broken granite.

The results obtained in Holland and Austria are not quite in agreement, especially as regards the effect of sand, the utility of which is denied in Holland. Nevertheless, from all the results obtained, we may reasonably conclude that concrete arches of a maximum thickness of three metres, especially if the concrete is made of brick fragments, the extraordinary tenacity of which is well known, will always furnish a secure enough shelter and that, for vertical obstacles, this thickness can be reduced.

In Italy experiments have been made, less costly but still interesting, upon the effects of charges of explosives upon improvised shelters. The covering of the shelter, which was  $2 \times 4$  metres and 1.7 metres in height, was composed of:—1st, Jointed rails, 2d—Cross beams of railroad iron, 3d and 4th—Two layers of large round sticks of wood; the whole covered with 1.85 metres of well rammed earth. A charge of 4.5 kilos. of explosive gelatine was placed at a depth of 1.5 metres, and at the bottom of the crater thus formed a second charge was exploded and then a third. Although there were some damaged places, the shelter was still in a serviceable condition.

One row of round sticks was then replaced by a layer of fascines, the other parts having been repaired. The resistance was not sensibly diminished, which can be attributed to the elasticity of the fascines. Finally, for the railroad iron was substituted a second layer of rails, the fascines being retained, and charges of 4.5 kg. gun-cotton tried. The three successive explosions gave results inferior to those of the gelatine.

Cappings, piers and foundations 20 cm.  $\times$  20 cm. square gave good results in the Italian experiments, thus confirming the results of those in Holland and Austria. —*Revue Technique.* By *Lieut. Van Deusen.*

## NAVAL GUN PROGRESS IN 1895.

The question of the proper calibre of the principal guns of first-class battle-ships has been much discussed during recent years, and the conclusions reached, in many quarters, are surprising and apparently indefensible. It seems reasonably certain that the heavy guns of battle-ships are principally designed to pierce the armor of possible enemies, and thus inflict injury upon what are styled the vital parts; and it appears equally certain that any gun which is unable to do this fails to possess the principal requirement of a heavy gun for the primary battery of a battle-ship of the first class. Yet the latest German battle-ship (designed in 1894), a so-called "first-class" ship, will mount guns of 9.45-inch calibre. Pieces of this size have, in the opinion of the writer, no *raison d'être*,—except possibly in coast-defense vessels. They are too light for the successful attack of heavy armor (the thick armor of the *Iowa* or *Indiana* is impenetrable by them at the muzzle on the proving ground), and unnecessarily and objectionably heavy for the attack of the casemate and citadel armor now so generally fitted. The same weight in heavier or lighter guns would be a vast improvement. In fact, taking into consideration the present power of guns, the resistance of armor, and the design of ships, the writer believes that the only really desirable calibres of guns are 13-inch, 8-inch, 5-inch, 4-inch, 6-pounder, 1-pounder, and machine guns. The 13-inch is needed for the attack of thick armor, the 8-inch for casemate armor, the 5-inch for the destruction of unarmored upper works, etc. The 8-inch gun is the proper heavy gun for the armored cruiser, or what, in these days, is nearly the same, the heavy protected cruiser. The 5-inch, being the largest true rapid-fire gun, has a wide range of usefulness. And the 4-inch is a valuable light cruiser gun.

In the *Army and Navy Year Book* for 1895, published a year ago, the writer stated that "the reaction against heavy-calibre guns has apparently reached its limit, and we may again expect a slight increase if there is any further improvement in armor." The improvement in armor has taken place, and, in the United States, at least, the increase in calibre of the heavy guns has followed it, the guns of the new battle-ships being of 13 inches, while those of the *Iowa* are but 12. In other services the limit still remains at 12 inches or less, but with a general tendency towards increased length. All the new French 12-inch guns are of 45 calibres length, and 12-inch of 50 and 55 calibres are under consideration. The French method of construction is adapted to the production of long and light guns. If it proves to be suitable for smokeless powders, as it seems to be, the effect upon ordnance and ship design will be very marked. All the heavy calibres are built up in a similar way. The new 305-millimetre (12-inch) may be taken as an example. There are two tubes, inner and outer, extending from breech-face to muzzle, and a single row of hoops over the breech. The outer tube is in two parts of about equal length, the joint covered by an additional light hoop. There is no powder-chamber; or rather there is one, but it is of the same diameter as the bore measured to the bottoms of the grooves. The screw-box is in the rear end of the inner tube. The gun is trunnionless, and has lugs and grooves for a saddle and straps. In the median calibres (9.45-inch to 5.46-inch) either the outer tube

or the jacket is omitted; some are made with a single tube and jacket, others with two tubes—the outer in several sections—and no jacket. The latest model of the 6.48-inch is an exception, however, having a long jacket and eight thin breech-hoops.

One of the most notable features of the new French guns, both of government and private construction, is their exceeding lightness. For example, the 305-millimetres (12-inch), L/45, weighs but 45.02 tons, whereas the United States and British 12-inch guns, L/35, weigh 45.2 and 46 tons respectively. If this lightening of heavy ordnance proceeds within safe limits and side by side with the development of suitable powder, it will be hard to say what will be the limit of length for naval guns.

The new British 12-inch guns are said to give satisfaction, but the advantages gained by the use of wire seem doubtful. They are said to be: 1. The certainty of there being no flaw in the material. 2. The initial tension can be regulated with the utmost nicety. 3. Steel wire has double the tensile strength of steel forged in tubes or hoops, and this increased margin of strength not only adds to the margin of safety, but will allow increased charges to be used without increasing the weight of the gun, and also provides a margin to meet sudden rise of pressure due to unforeseen circumstances, such as might occur with powders stored in hot magazines. Flaws that seriously affect the strength of a tube are not likely to occur; we might almost say will never occur in good material, properly worked and carefully inspected. There is an advantage in the nice adjustment of the initial tension, but is the adjustment permanent? Lastly, is the additional tangential strength worth the trouble and expense when associated with decreased longitudinal strength and stiffness, greater vulnerability, and greater weight? The designed muzzle velocity of the gun is no higher than would be obtained in a United States built-up 12-inch gun using cordite and the same projectile. In fact, using Leonard smokeless powder, which is similar to cordite, but apparently better, an American 35-calibre 12-inch gun will give about 2600 f. s. velocity, with the service projectile of 850 pounds and a safe chamber-pressure about equal to the pressure ordinarily used in the service.

The new British 6-inch wire-wound guns are even less to be admired. The length is 40 calibres, weight 7 tons, or 1 ton more than the American 40-calibre 6-inch. With cordite, the expected muzzle-velocity is 2200 feet, while with our new gun-cotton smokeless powder, the American gun has given over 2600 feet, and the service velocity with brown powder is 2150. Moreover, the first and weakest 6-inch gun built for the United States naval service withstood continuous firing with a chamber-pressure of 27 tons per square inch. Other and more severe tests, of which we are not at liberty to speak, have shown that the strength of our built-up guns is vastly greater than any possible strain to which they will ever be subjected.

Taking everything into consideration, it seems probable that the wire-wound gun, as we know it to-day, will not form part of the ordnance of the immediate future, unless we return to quick-burning powders or higher service pressures. The use of wire reduces the longitudinal strength and stiffness, without which long guns of moderate weight are impossible.



Continental powers seem to be following the French in great length of guns, but while they have not gone quite so far in that direction, they have gone further in the reduction of calibre. Their conclusions as to calibre are, consequently, less defensible. The Austrians have placed 9.45-inch guns on their new coast-defense vessels and are building no large battle-ships, but they say that if they were, the 9.45-inch gun is the largest they would mount. The Germans are said to have adopted 9.45-inch for the heaviest calibre in their latest first-class battle-ship. The Russians have never used guns larger than the 12-inch, and there are no signs of change in calibre. They have used long guns for years, and in this respect, are at present following the French. The Italians, who have always been extremists in naval matters,—size of ships, thickness of armor, removal of armor, size of guns, reduction of displacement, reduction of gun calibre,—have adopted the 10-inch gun for their new so-called first-class battle-ships; vessels which are, by the way, nondescript constructions hardly fit to take rank in the second class of other powers.—*From the United Service, Philadelphia.*

#### ORDERS IN THE FIELD.

At the Royal United Service Institution yesterday Lieut.-General Sir Frederick Middleton, K.C.M.G., C.B., presided on the occasion of an interesting paper on "The Framing of Orders in the Field" being read by Lieut.-Colonel G. F. R. Henderson, York and Lancaster Regiment, Professor of Military Art and History at the Staff College.

After giving a brief but very instructive historic sketch, showing the vast importance of clear and complete orders, Colonel Henderson proceeded to deal with the art of expressing one's intentions in proper form, and, at the same time, with that rapidity which the exigencies of active service demand. To the objection that for the staff officers of the smaller units, and more especially for regimental officers, verbal and not written orders are and will continue to be the rule, the first answer is that regimental officers do not remain regimental officers all their lives, that they may possibly rise to high command, and that it is their bounden duty, if they intend to accept such command, to fit themselves for its functions by every means in their power. The second answer is, that while it is perfectly true that many orders, in presence of the enemy, must of necessity be verbal, yet if verbal orders are to be clear and complete some previous practice is necessary, and constantly writing them is the best practice. Again, written orders can be more readily criticised than verbal ones. Mistakes are more patent; excuse is impossible; and the order, improved by the instructor, remains as a guide for future use. Thirdly, it is an unfortunate circumstance of war that units cannot always be kept intact, and the commander must often use an intermediary. It is a notorious fact that in war verbal messages, as a rule, are more often incorrectly than correctly delivered. Even at peace manœuvres this is the case. In the excitement of battle it is almost impossible to avoid it. While, therefore, verbal orders are often the only orders possible, practice in giving such orders is absolutely essential, and facility in writing orders will give facility in issuing them by word of mouth. Wherever, therefore, possible it is far better to reduce all orders to writing.

The issue of verbal orders is most carefully practised in the German army, and all officers, from the time they join the service, are constantly and systematically trained in this essential phase of the art of command. What may be called the verbal war game is a method which is much used in some, if not all, of the Imperial Army Corps.

The great difficulty which confronts officers in our service is the lack of theoretical instruction and of good models. The question really resolves itself into this: How are officers, who intend to attain such skill in framing orders as to be able to instruct others, to instruct themselves? Where are the examples with which they can compare their own efforts? Where are they to find the rules and principles which should be followed? Unfortunately, even the best of our military text-books have little to say on this important subject. In Germany, however, the contrary is the case. Not only is the bearing of orders on both strategy and tactics adequately recognized, but orders are the vehicle of all theoretical instruction. The manner in which principles are applied is taught by imagining a certain force in a certain situation, giving the orders best adapted to the circumstances, and supplementing them with a full explanation of the reasons which dictated them. The best of the tactical treatises which follow this method is the work of Captain Griepenkerl. This work, which deals at length with the operations of a small detached force of the three arms, contains a large number of excellent orders, and many admirable suggestions as to the considerations which must be borne in mind when writing them. Complete instruction, moreover—so far as rules and principles, without models, can instruct—is to be found in Colonel Hare's excellent translation of the "Duties of the Great General Staff," published by the War Office, and giving what is practically a summary of Von Moltke's methods and Von Moltke's teaching. This volume, at the same time, is perhaps the most valuable tactical text-book which exists, for it embodies the experience of two great wars, and the chapter on orders is so full—at least, as regards European warfare—that it is hardly necessary to go further. The "*Felddienst-Ordnung*," translated by Major Gawne and Mr. Spencer Wilkinson, under the title of "The Order of Field Service of the German Army," has four short pages on orders which are nearly as valuable as the instructions for outposts.

Orders in the field come under one of three headings:—

In Wellington's army, for instance, there were—

1. *Standing Orders*.—These were issued in the form of General Orders, were gradually embodied in printed volumes, and issued to all commanding officers.
2. *Daily Orders*, dealing with administration, discipline, subsistence, and sanitary arrangements; issued by the Adjutant-General's Department.
3. *Operation Orders*, dealing with marches, attack, the occupation of positions, etc., etc., and issued by the Quartermaster-General's Department.

Of the first, the Standing Orders of the Light Division, compiled by General Crawford, are the best example. They contain much that is embodied in our present Drill Book, for it is to be remembered that in the

days of the Peninsular War there were no tactical regulations with which every officer was familiar; and at the same time they contain much that was only applicable to the country in which the troops were then operating. This must always be the case. Standing orders, especially such as refer to supply and transport, police and camp followers, marches, outposts, encampments, pay and subsistence, must vary with the theatre of war.

Daily orders are not peculiar to the field, and are similar, *mutatis mutandis*, to those issued in peace.

Operation orders are the important part of the subject, and whereas standing and daily orders have a very large scope, the orders for military operations are strictly limited. Dealing all of them with the enemy, and with the means by which he is to be defeated or checked, they follow much the same form, and may be embodied, to a great degree, no matter what the situation, in almost identical phraseology. In orders for marches, for attack, for defense, and for outposts, words and expressions may be said to be stereotyped. The question of the shape in which orders should be issued, however, is one on which there is not complete agreement. For the march, for outposts, and for the occupation of a defensive position, when time is not pressing, a combined order is the best method of securing intelligent obedience. When time presses, on the other hand, the speediest method of directing the troops may be to send a separate order to each portion of the force.

"In orders," it has been said, "tactics crystallize," and from orders, applied to a concrete situation, the extent of the knowledge of the man who gives them is most readily determined. The examinations for promotion are to-day chiefly concerned with orders, and this is a long and most practical step forward. It would seem, however, that preparation for such examinations and instruction in the art of framing orders cannot begin too soon. Simple orders might well be made a feature of all military examinations. From the moment a boy joins as a cadet he should be taught to apply the principles of tactics by presenting his ideas in the shape of orders, and a movement in this direction has already, I believe, been made at the Royal Military College. No tactical scheme, to my mind, can be called complete, nor can full profit be derived from it, unless this is done, and unless, at the close of a field-day, the orders issued are closely criticised, full advantage has not been taken of the opportunity for instruction. At the Staff College the framing of orders has long been one of the main features of the course. Every year its importance has become more clearly recognized; and at the present moment an order in one shape or another is attached to almost every report that is submitted. The system has gradually developed, and to get the best value out of written and also out of verbal orders students should be asked to give their reasons for every paragraph of their orders. This system has been lately established at the Staff College by the present commandant, and with the very best results. If officers have to give the why and wherefore of every decision; if they have to explain why their detachments are of such and such a strength; why they put a battery with the advanced guard; why they send a certain number of squadrons in a certain direction; why they consider so many compa-

nies sufficient for a rear-guard, etc.; and if they are clearly given to understand that to say such a disposition is suggested by the Drill-Book, or is the custom of war in like cases, is no reason at all, they will soon learn to exercise their judgment, to discard leading strings, and to apply their common sense to the work before them. It is excellent practice to issue orders on the ground, without a map to which to refer. English soldiers have generally to fight in countries where maps do not exist, and it is of very great importance that officers should acquire the habit of describing roads, tracks, and natural features, so that there may be no mistake as to direction or objective.

With this advice to his brother instructors—and now-a-days who is not an instructor in the Army?—Colonel Henderson brought his lecture, which had been listened to with great attention, to a close. To those Regular officers—if such there be—who are not Cromwells or Stonewall Jacksons, who are merely ordinary soldiers, and not great men of action, who lack something of the clear insight and the unerring decision of military genius, the gallant colonel trusted he had made clear the necessity of perfecting themselves in the art of writing orders. Those who were not Regulars he reminded that Wellington, in words that should be forever memorable, said of the Spanish troops in the Peninsula that they had enthusiasm enough, but that they lacked two essential qualities—habits of obedience on the part of the men, habits of command on the part of the officers.

Without suggesting for a moment that there is any resemblance between the magnificent material of our citizen soldiers and the ignorant and half-starved levies of Spain, Colonel Henderson expressed the opinion that to some degree at least these words must be true of all troops who are not Regulars. It is impossible that it could be otherwise. Discipline is neither an hereditary nor a natural instinct. It is created by habit, and by habit only. But just as on an ordinary parade, the officer who has a good word of command, who knows his drill, who betrays neither hesitation nor uncertainty, is readily obeyed, so the officer who has learned to give clear and unambiguous orders, leaving no doubt as to his intentions, and no doubt as to what he expects, has acquired something at least of the habit of command. From practice comes confidence; and confidence, apparent in every tone of a man's voice, begets confidence in others.—*From the United Service Gazette.*

#### A NEW FIELD HOWITZER.

The following figures relating to the new field howitzer which has attracted the attention of correspondents at the French Manœuvres since 1891, are taken from *L'Avenir Militaire* (No. 2057). The official designation is "canon de 120 court" calibre, 4.33 inches; weight of shrapnel, 45 lbs.; bursting charge, 280 grammes, F<sup>a</sup> powder; number of bullets, 630 of half-an-ounce each. The weight of the Melinite shell is not given, but is four calibres in length. Three charges of smokeless powder are made up, of 550, 330, and 220 grammes each.

The gun itself is of steel and weighs 1518 lbs.; the carriage without limber, 1727 lbs.; and the limber, 2958 lbs.; or 55 cwt. 87 lbs. behind the team,

rather a serious load for eight horses, the number we actually saw employed in 1891. The gun is partially enveloped in a hydro-pneumatic jacket to control the recoil, and the maximum play allowed to the barrel is 18.5 inches.—*Journal R. U. S. I.*

#### EFFECT OF THE LEBEL BULLET IN MADAGASCAR.

The *Spectateur Militaire* publishes the following note from the medical officer with the Madagascar Expedition relative to the effect of the Lebel bullet on the Hovas:—"The wounds externally, both of entrance and exit, were so small as to be almost invisible, bleeding entirely internal; but as regards the fractures of bones, I have convinced myself that where the bullet meets a bone it occasions damages only comparable to those of melinite." Further information on this subject is much needed, for the diameter, weight, and velocity of all service weapons, being so nearly alike, it is not clear why the French bullet should produce worse results than either the British or German projectiles. It may be noted that the German experiences in Africa against living targets correspond very closely with our own in Chitral.—*Journal R. U. S. I.*

#### GERMAN LOSSES IN BATTLE.

The following figures, taken from Dr. Engel's statistics of losses in battle 1870-71 show the relative risks run under fire by the different arms and ranks in the German army during the Franco-German campaign:

The total number of men hit were: in the infantry, 103,569, including 4365 officers; in the cavalry, 3546, including 262 officers; in the artillery, 5869, including 421 officers; and in the engineers, 402, including 41 officers.

Hence, for every 1000 infantry hit, 42.1 were officers and 957.9 men; of every 1000 cavalry, 73.9 were officers and the rest men; and similarly for the other arms, 71.7 and 102 per thousand respectively were officers.—*Journal R. U. S. I.*

#### THE SERVICE.

The service has already suffered from the inaptitudes of officers who have only attained to responsibilities when they should have long exercised command, and after years of subordination have unfitted them for it. If the army is to be commanded by its best men, our officers must reach the higher grades when they are young, enthusiastic, and full of energy. To compass this the old men of to-day must step aside. They may think this unjust, but they will be cared for, and the real injustice is felt now: it is the injustice to the country involved in the system which makes the army the asylum for old age and a grave for youthful ambition.

## Comment and Criticism.

### "The Defense of Our Frontier."

First Lieut. W. E. Birkhimer, 3d Artillery.

WE see under this head a continuation of the discussion originated by Colonel Rice in the September, 1894, JOURNAL, and commented upon by us in the next succeeding number.

The Colonel, in the present article, has done us the unusual honor to devote almost his entire attention to our remarks upon his previous effort. Our purpose now is to continue our remarks upon the subject-matter of both papers.

The only question involved is this: Is the militia a force that the general government successfully can rely upon to conduct war? Colonel Rice maintains the affirmative. We the negative. Those interested can follow the argument and judge.

The character of the personnel of the militia is not impeached. They are the citizens, and often the most enterprising of the citizens of the States. Upon them, or men like them, the honor and perpetuity of the nation rests. As citizens they deserve and richly, the best that can be said of them. But, when it comes to organizing them into State forces, as Colonel Rice shows the militia to be, and rely upon them for national military purposes, the question is altogether different. Experience has shown that they could not, in the past, and reason tells us that in the future they cannot be depended upon for carrying on even moderately prolonged military operations.

The question of the extra-territorial use of militia is but an incident, although an important one, to the main proposition. There are two ways of regarding this question, viz., the military and the constitutional. That, at least, seems to be what examination develops. Colonel Rice takes the former. We agree with him. Nevertheless, it were useless to ignore the fact that the almost unbroken current of authority is the other way. In his present article the Colonel quotes Von Holst extensively. Yet this writer says "the militia cannot be taken out of the country." Again, Mr. Ordronaux (Professor of Law, Columbia College, N. Y.) says: "The Constitution distinctly enumerates the three exclusive purposes for which the militia may be called into the service of the United States. 1. To execute the laws of the Union. 2. To suppress insurrections. 3. To repel invasions. These three occasions, representing necessities of a strictly domestic character, plainly indicate that the services required of the militia can be rendered only upon the soil of the United States or its territories." Pomeroy in his "Constitutional Law" says that the militia cannot be, while Rawle says they may be, taken outside the territory of the United States for military purposes. We leave others to say where the weight of authority lies here.

There is, perhaps, no better construction of the Constitution than is to be found in the Federalist and in the debates in various State conventions which ratified that instrument. It is impossible for a candid person to read the expositions of the fundamental law there so fully and ably made without concluding that, in the minds of the Fathers, the militia was intended under the Constitution for use only upon the soil of the Union. The question was not evaded as to what the power of the general government over the militia



was. On the contrary, it was urged as one of the objections to the ratification of the Constitution, and pressed with earnestness, that the general government had too much authority in the premises. It was said that militia might be moved from Georgia to Massachusetts, and this the objectors urged as a fatal power. The friends of the Constitution admitted this; but plead the necessity of the case, and claimed that it could not happen except in greatest extremity. This marked the extreme limit of the objection urged and power claimed: the whole tone of the *Federalist* and the debates in ratifying conventions showed that no one at that time thought for a moment of claiming that militia could be used extra-territorially. And it is far within the bounds of moderation to express the belief that, had the friends of the Constitution for one moment intimated that militia under the Constitution could properly be so used, the result would have been fatal to their fondest hopes: it is not believed, after a thorough review of the subject that the Constitution ever could, in the face of such avowal, have been approved or adopted.

In the light of our colonial history this result was not surprising. It is not here asserted that, upon no occasion, were militia, under colonial rule, moved beyond the territory of the English colonies. It is not known but that some such case occurred. But none is now recalled, this, though extensive research upon the point has been made. It is true that our ancestors in those early days often invaded the territories of the enemy. In the Indian wars, within the colonial limits, drafting was often resorted to; so during the Revolution for service within the United States; but no instance now is recalled where foreign service was otherwise than voluntary, precisely as under our present acceptance of the term United States Volunteers. An instance during the Commonwealth will illustrate this point. Cromwell called upon Massachusetts for 500 soldiers as part of an invading force against New York. The colony had every motive that could actuate men to stand well with the then iron ruler of England. Yet it voted the men only on condition that this foreign service should be absolutely voluntary.

This limitation on the use of the militia in the Colonies was very natural. By the charter of Massachusetts they could not be taken beyond the limits of that Colony without consent of the legislature. Down to 1811 the militia of England could not be moved even to other parts of the United Kingdom. So at the time of the adoption of our Constitution the idea of a restricted sphere for militia was generally inculcated both here and in the mother country.

The question of extra-territorial use of militia, as was remarked in our former comments, has often been debated in Congress. This was particularly the case prior to the War of 1812 and again at the outbreak of the war with Mexico. At the former epoch the Federalists almost if not quite to a man opposed the idea of such foreign service, and a great majority of the Republicans took the same view. In 1846 Senator Crittenden and Mr. Garrett Davis, both of Kentucky, were about the only persons to suggest that militia might be so employed. They made no impression upon Congress. Legislation all went to either a permanent or temporary increase of the regular army, or to raising volunteers. For the purpose of conducting a foreign war the experience of this country, and the performances of the militia themselves, when called on for service in face of the enemy, beyond our borders, had caused them to drop completely out of governmental calculations.

Colonel Rice proposes to take the Welland canal with militia. Under all the circumstances he will excuse us for not entering with his enthusiasm into the scheme. We have heard of such promises before. On March 5, 1806, Mr. Crowningshield in the National Congress said: "I do not believe Great Britain will go to war. Her trade with us is too valuable. She knows that in that event she will lose her eastern provinces. The States of Vermont and Massachusetts will ask no other assistance than their own militia to take Canada as well as Nova Scotia." And Mr. Clay, not to be outdone, exclaimed: "I

trust I shall not be deemed presumptuous when I state that I verily believe that the militia of Kentucky are alone competent to place Montreal and Upper Canada at your feet." What a contrast, the fulfilment with the promise! Yet these patriots were as sincere as Colonel Rice, relied with as much confidence, and they honestly believed with as much reason for that confidence upon the willingness and ability of the militia of their day as the Colonel does now.

How about transporting the militia to Venezuela? We can imagine this might cause more serious qualms of a constitutional nature about going beyond the line, than ever before. If we go to war over that country because of the Monroe or any other doctrine it might be necessary to send troops there. The war might not be with England. France and Germany, we understand, have serious contentions with that people; and we may be called upon to invoke the alleged Monroe Doctrine equally against them as against Great Britain. Does anyone think, at this day, that the militia of the States self-christened though they be as "National Guard," could be depended upon to be carried to Venezuela, to wage war in that distant land?

Nor does it remove the objection to relying upon militia that some of them may be willing to cross the border. The Government, when it tries conclusions with a foreign nation must have troops, not some of whom, but all of whom it can depend upon for every kind of service, wherever, on the face of the globe, these services, for the purpose of securing victory in that war are needed. Yet with what feeling of certainty, could it embark in hostilities if militia were the only species of troops at hand? Who is to select those who are willing from those who are unwilling to serve outside of the territory of the United States? Where is this selection to be made; at home, or when the border is reached, and the enemy arrayed on the other side? Van Rensselaer tried it under the same circumstances, when our other brave troops, heroically, and in plain view, were being deprived of hard earned victory, and his experience may well serve as a warning. None would cross the line!

The Colonel says truly that he is doing a good service who makes plain to the people where 108,000 good troops are to come from. Granted; but he who points out that force as available which cannot on the day of battle be depended upon, does harm, however well intended the motives. When President Lincoln called out the militia in 1861, the Governor of the loyal State of Delaware restricted his to the confines of the State; the Governor of Maryland to the limits of that State, and the defense of the National Capitol. And during the war, on one occasion now recalled, part of the Missouri Militia refused, when ordered, to cross the line between that State and Arkansas.

This was in accordance with the trend of the teachings of the past. "Would you," exclaims Mr. Galshon of Va., "expect to conduct a war with militia? On the contrary, are you certain that the militia are constitutionally qualified to embark in that kind of war [foreign] in which we would in all probability be involved? It is a serious question whether the militia can be carried without the limits of the United States." \* When Mr. Randolph introduced the bill which first provided arms for the militia [Chapt. 53. Apr. 23, 1808] Mr. Holland of North Carolina remarked that if the President called the militiaman one way, and the Governor of his State the other, the militiaman was bound to obey the latter.† Mr. Jefferson experienced the truth of this remark—when, pursuant to law, he called upon some of the Governors for detachments of militia to help the civil authorities enforce the embargo laws, he found them determined to exercise their own judgment whether or not they would respond to his call. This led, contrary to the Re-

\* Vol. 19. *Annals of Cong.* p. 1319. et seq.

† *Annals of Cong.* Vol. 18. p. 2175.

publican teachings of 1798-99, to his efforts to supplant militia by volunteers. And, referring to this species of troops Mr. Taylor of South Carolina said: "It has been thought necessary to have a body of this kind who, though not composed of regulars, might serve all the purposes for which an army might be wanted. It is true that the Constitution allows us to call upon the militia for the public defense, but it prohibits the marching of them out of the limits of the United States."\* Mr. Dana of Connecticut observed: "with respect to marching the militia into Canada, you might order them, but I do not believe they will go, because I do not believe that the militia constitutionally can be required to march beyond the frontier." In the Senate, Mr. Giles of Va., remarked that the militia, confessedly, could be used to enforce the laws of Congress. Such a law might provide for taking possession of a foreign country. The militia might be used to execute such a law. In doing this, he maintained, they might be carried outside the United States. To this Senator Bayard replied that there was no warrant for employing militia for the purposes of conquest. Engaged red-handed in conflict, they might pursue a flying invader across the border, to effectually repel invasion, if need be, but that was the limit to which their extra-territorial use would go under the Constitution. The militia, he maintained, were for domestic use only.

On pages 312-13 of the JOURNAL the Colonel refers to Mr. Key's attempt in January 1812 to limit the operations of the troops, a bill for raising which was at the time before the House of Representatives, to the limits of the United States, and truly observes that it was overwhelmingly defeated. This bill, however, proposed to raise a corps of volunteers. The impropriety of so limiting their services was then and ever has been well-nigh unanimous in the opinion of the people.

The Colonel thinks that nine months' militia service will be sufficiently long, as wars in the future are likely to be brief. He cites in support of this view the wars of the last thirty years. It is to be regretted that such ideas should still exist in this country. This hope that the war with its distressing incidents would not last long, nearly lost us our independence, and since then has cost this nation thousands of lives and many millions of treasure. It beguiled the patriots of 1775 into nearly fatal, half-hearted measures of resistance to the British crown; it sprang up once more with baleful influences when preparations were making for both the War of 1812 and that with Mexico; listening to its siren-like voice the people for a while were deluded with the belief that the greatest civil war of history in point of troops engaged and resources involved, and which lasted upwards of four years, would be a mere skirmish of sixty days at most. Short wars indeed! Has not blood enough yet been shed to dispel this illusion! Nor can the force of the inference, or argument, drawn from the instances cited in support of this theory be conceded. Suppose the Germans or the Japanese had assailed the enemy with nine months' troops instead of those engaged for the war, while that enemy had the latter species of troops; moreover, suppose it were known that, while some of the nine months' men would probably cross the border, yet this was contrary to past experience, the teachings of constitutional lawyers, and the almost unanimous voice of the national legislature, would not such considerations materially have affected the question of the length of the war? Would Austria, France or China have made the humiliating terms they did if the victorious enemy, the terms of service of his troops having expired, was turning his back upon his conquests? We apprehend not. On the contrary it stands to reason that the vanquished, with his long-service troops would bide his time, and assail his temporary victor with renewed vigor when his short-service army was dissolved. Such a policy, instead of shortening, would prolong the war.

When the Mexican War was precipitated, the President, in his message announcing the

\* Annals of Cong. Vol. 19. p. 1212.

fact, recommended the raising volunteers. The use of militia for the purpose was never entertained by him for a moment. In the debates growing out of the war-measures being taken, Mr. Davis remarked that the proposed laws (chapt. 16, May 13, 1846, and chapt. 29, June 18, 1846), were artfully drafted to supersede wholly the appointment of general officers by the States. He moved an amendment to the effect that the volunteers called out should be deemed to be militia of the States in the service of the United States, but these views were rejected almost unanimously.\* Volunteers, a national, and not a State force, were the troops to be depended upon. This force has stood the test of battle. They form the hope of the Union. As a fighting force for national purposes the volunteers have supplanted the militia completely. It was to the 158,000 veteran volunteers, who, their terms of service having about expired, reenlisted, that we mainly owe the fact that to-day we have a united country.

Colonel Rice explains that, because of the abuse of the term militia, some new term must be adopted to designate the State forces. This is the severest arraignment of the militia that has come under our notice. It is hoped that militia are not ashamed of their constitutional designation in all the States, nor do we believe they should be in any. Does the Colonel suppose that a mere change of designation will affect the nature of the military institution. If the militia be State troops, as on all hands is conceded, merely calling them "National Guard," "State Volunteers," "Organized Militia," or by any other of the forty-three designations that the various States of the Union may, with equal propriety capriciously adopt, will not metamorphose them into a different species of troops. It can have no other than a confusing effect regarding the character, the purpose, and the obligations of the force. A stranger to our institutions, hearing the term "National Guard" used, would imagine that this was a designation given by the National Government. He would probably be surprised to learn that this was not so; that it meant only a State force, and was a term appropriated by distinct States as inclination so disposed or not, to a force that only rarely, and then for limited and specific purposes was permitted by the Constitution to be called into the service of the National Government. He would still further be surprised to learn that this incongruity between the designation of the State force, and the species of troops—one national, the other State—is simply an escape from the abuse of the term by which the national Constitution designates the State forces.

The military code of Illinois, to which the Colonel refers, furnishes the best evidence that changing the name does not affect the quality of State troops. While adopting the aspiring term "National Guard" for a certain portion of the "militia" of the Constitution, that code provides that it is not to be moved beyond the limits of the State without consent of the Governor. We are aware of the fact that the Supreme Court of that State has remarked that this inhibition does not apply when the President calls out the militia. This, however, does not bind the Governor. And we know from past experience that governors do not hesitate in the exercise of authority, particularly military authority, to dissent from the views of the President. Of this the State of Illinois furnishes a recent and instructive illustration. The late tumultuous and revolutionary events, paralyzing at a point within that State the business affairs and commerce of the nation, are yet vividly impressed upon the minds of all. The President of the United States, acting under the law, moved the national troops to the centre of the disturbance to do what the "National Guard" of Illinois had failed to do—quell the uprising then rapidly, under the eye of the Governor, developing into formidable rebellion. All recall, also, the issue then made by the Governor with the President for adopting these patriotic and effective measures, for which the latter was afterwards unanimously thanked by the National Congress. Have we any more security that, if the President called out the Illinois National

\* Cong. Globe, Vol. 13, June 2, 1846.

Guard, the Governor of that State would agree to the measure unless it met his approbation; and, if he should not, he certainly has the plain language of the Illinois code to stand upon and from which to defend his course. That, except in name, is a singular kind of national guard; and the name, when we reflect what political organization gave it, and the avowed reasons for giving it, is the most singular feature of all.

Nor are we wanting in other evidence that merely changing the name does not of itself, make the militia a force that can be relied upon—even for State service. None will have forgotten that, contemporaneously with the events just referred to, the National Guards in a particular State refused to obey the orders of their officers, permitted themselves to be insulted with impunity by a mob whom they were called upon to charge and which they refused to charge but allowed to defy them, and to trample law and order under their feet until the President here, as in Illinois, brought the national troops upon the scene. In another State a companion-piece came simultaneously upon the stage. The Governor, the laws being defied, called upon State troops to perform their constitutional functions. They refused to obey his orders; and, adding insult to their commander-in-chief to insubordination, threw their arms at his feet. What confidence can be placed in such troops? None whatever.

When the United States engages in war, the dearly learned lessons of the past should not be ignored. They are not forgotten. The most important of these is the absolute necessity that exists for enlisting all who offer themselves in the first stages of the conflict, before enthusiasm or patriotic ardor have given way even partially, to more selfish motives,—for a long term of service—three years at least or for the war. During the Revolution, the War of 1812, the Mexican War, and the War of the Rebellion, we were taught by melancholy experience, before, in each case the war was over, the supreme folly of adopting a different course. The Government should take all the long-service men at once whom it can get, and for the longest time for which it can get them. We have always paid for the adoption of a different course by the lives and substance of the people. For this reason alone militia are unfit troops. Under favorable circumstances otherwise, they will just about begin to become seasoned when their maximum term of service—9 months—will expire; and they cannot be expected to remain after that. In time of war the National Government wants soldiers who have enlisted for the sole purpose of fighting. They must have, which organized militia have not, that eventuality in direct prospect when they enlist. Comradeship among such men, born of the march, the bivouac and the burns an intense and sacred flame; but all associations, merely of the club or the gymnasium, are there out of place. Experience has shown in this country that the soldier upon whom alone Government can place confidence when war comes in earnest, must go forth with mind and energies consecrated to the cause for which he fights. Short service troops cannot do this. While marching towards the enemy, if they ever march that way, their thoughts, hopes and affections travel in the other direction. That is the evidence of every commander who has led our armies against the foe. It must be so. It is human nature. The term of service is a fair index to the ardor and spirit of self-sacrifice of the soldier. While the long term volunteer marches with determination depicted in every lineament, to meet, to grapple with and overthrow the enemy, he of short service dwells with ever-increasing fondness, until freed from his engagement, upon the allurements of the home-fireside. Such are the unvarying reports of our commanders. This fact, if all other objections were removed, would render militia the most expensive and inefficient troops we can employ for the trying service of actual war.

What then is the function of the militia? We reply that which the Constitution assigns to them. They are the military forces of their respective States, which appoint their officers, and train them according to the discipline prescribed by Congress which also has

power to provide for organizing and arming them. The States employ their militia to preserve order and maintain their own integrity. The militia may, for certain enumerated purposes, be called, temporarily, into the service of the United States; and, when so employed, Congress has power to provide for their government.

But the United States does not depend upon these State troops, so temporarily employed, for the great purposes of war. It is fortunately relieved from that dilemma. The Constitution gives Congress power to raise and support armies. A century's experience has demonstrated how this constitutional power best can be exercised. It consists in maintaining a small regular army, ready for all the purposes of war and national objects demanding the services of an armed force to which the numbers of this small army are adequate; and it also serves as the conservator of military customs, correct principles of military discipline and subordination, and constitutes the training-school of officers during peace, for the more extended and multifarious duties of war. The Military Academy lies at the basis of the system. When war breaks out this small army, carefully disciplined and kept abreast of the military progress of the times, is utilized to the utmost. It gives form and system to the volunteers who then enroll themselves in the military service of the Government. These volunteers will, if the war be one of great magnitude, such as we must calculate upon, become in numbers the principal force upon which the Government will rely. The officers of the Regular Army either remain with their proper commands which now owing to the preference of American citizens for volunteers are generally much reduced; are appointed at the mutual convenience of the United States and the State authorities to higher commands in the volunteers; or they are appointed to the discharge of staff duties, the correct performance of which now is difficult, yet of greatest importance, and which their previous training has fitted them for. And herein is discerned the wisdom of the regular army system which has been built up by the legislation and usage of more than a century.

The militia organizations which have been efficiently kept up during peace send into these same volunteers many, and among them the best, of their personnel, both officers and men; not for an ineffective term of nine months, but enlisted especially for the purpose, and for a term of years or for the war. Here it is to be hoped, and it is believed the training previously had in the militia will be of advantage, not only to the ex-militiamen themselves, but to their new organizations, raised and sent forth not for home and fireside service, but for the great national purpose if need be of carrying war into the enemy's country.

In this manner the Regular Army and the organized militia of peace times, working to the same end, yet each in its proper sphere, coöperate towards national preparations for war. The former moves bodily, the latter contributes by volunteers from its personnel, who then come forward. To both these are added the yet far greater number of volunteers, who previously have belonged to neither the army nor the militia; the whole constituting that armed host which, when war is precipitated, rallies around the standard of the Union. No more suicidal policy could be adopted, conceding it were practicable, which happily it is not, than to send the excellent officers and men of the organized militia whom the country wants for long terms of service, and who are willing to enroll in these volunteers, away for some nine months, while the vital force, the long-service volunteers, are being organized for the war. This time would just be sufficient to keep them out of the United States volunteers, and at a time too, when the country most needs them, not for transient, but for prolonged services.

All that the Colonel says as to the desirability of maintaining cordial relations between the National forces and the militia strikes a responsive chord in every breast. The one is raised for national, the other, primarily, and with rare exceptions as to service, for State



purposes. The propriety of hearty coöperation between them, however, is in nature similar to the necessity existing for unity between their respective political sovereignties. Let them be bound together in high ambitions to act well their allotted parts in the economy of government. Thus will we have "an indestructible Union composed of indestructible States." But, in accomplishing this, let not for an instant the mistaken idea gain foothold that the militia of the States, short-termed as to service and limited as to their field of action, is either a safe or appropriate force upon which, for great national purposes in time of war, that Union can or should rely. Here in like manner as between the States and the Central Government, it is proper that each force should clearly understand and keep within its appointed constitutional sphere.

## Reviews and Exchanges.

### Our Coast Defense.\*

WHILE artillery officers are expounding at length in our service journals the requirements and theories of coast defense and showing by argument and example what should be done for our proper protection, the measure of ignorance and misinformation on this subject among the people remain practically undiminished and unapproachable. It would be better for the country and our hopes if there could be established a bureau of intelligence (on a new plan) among us for the purpose of disseminating the true needs of coast defense in a manner to attract public interest. It seems very unwise to leave to the casual editorial writer the exposition of our necessities and the technical values to be placed on defensive matériel. We should seek also to direct into the channels of exactitude the flamboyant oratory of the responder to the toast to "The Army." A "citizen soldier" has recognized this weakness in our front and has generously and modestly volunteered his aid. It is a reinforcement of which we may be proud and on which we can rely with confidence.

Mr. James A. Frye, First Lieutenant of the Massachusetts Volunteer Militia and Adjutant of the First Regiment of Infantry of that State, is writing a series of papers entitled "Our Coast Defense," for *The Bostonian*, a monthly magazine published in Boston and of which two parts have appeared to date, in the March and April numbers. The articles are illustrated and arguments made attractive by maps, photographic reproductions, and the author's own sketches.

The March number might be summarized as follows: Technicalities to be avoided; newspaper ignorance; our citizens too sanguine; navy as part only of defense; comparative table of war vessels of all classes; population concerned in coast defense; exposure of public and private manufactories of war supplies; no reserve of guns for Lakes while England well prepared; work of Fortification Board; indifference of Congress to our needs; General Schofield's report; aid, not from Congress, but from the people.

Lieut. Frye's arraignment of Congress for its errors of omission in the work of coast defense is pithy, exhaustive and true. He handles this portion of his task as though he liked it, as a small quotation will illustrate.

"These papers, as it has been said, cannot attempt to deal with politics or with questions of foreign policy; but it seems pertinent to invite attention to the strange fact that this Congress of the United States—a Congress that lays upon the table any bill having for its object the strengthening of our sea-coast ports—is none other than the one that, in mid-December last, looked complacently upon the possibilities of war with the foremost naval power upon the globe. Has it so soon been forgotten how France, a short quarter-century ago, light-heartedly plunged into a war for which she was all unprepared, only to emerge from it after being stripped both of territory and of five billions of francs in money? It truly can be said that it remains for one citizen of responsibility to bring forward the proof that we, in our present condition, are even one-half so well prepared for war as was France when she gayly sent forth her armies to meet their inevitable fate.

\**Our Coast Defense.* By Lieut. James A. Frye, M. V. M. *The Bostonian*, March, 1896.

Our history for the past twenty years proves only too conclusively that, with our government, every question, no matter how trivial, claims precedence of our military necessities."

The author's tribute to the officers of the army is unreserved and gratifying; and I quote it here that each of us may judge for himself if it be flattery:

"Every attempt made by our leading military scientists to awaken their countrymen to a realization of the unsatisfactory condition of affairs along our seaboard is characterized by the press as an hysterical outburst of childish fear, or as the selfish attempt of the army to attract attention to itself. But men in the military profession are not prone to give way to attacks of hysteria; intelligent apprehension is far different from fear; and if any body of citizens in our broad land may lay claim to the attribute of unselfishness, that body may be found in our self-sacrificing and neglected, highly-educated and ill-paid corps of army officers."

The April paper gives the following summary: Anti-coast defense sentiment; Grant's message, 1873; Congress responsible; lessons of 1814; both political parties indifferent; annual appropriations; distribution of revenue; coast defense from a business point of view; friends of coast defense in Congress; Senator Proctor's speech; methods of naval attack; present state of our defenses; the new ordnance; the new works; future prospects.

The author's presentation of the distribution of the national revenues is forcible:

"From every dollar appropriated we have given forty-three cents to our pensioners: this is patriotism, and in this we stand unique among the nations. From every dollar appropriated we have devoted *four mills* to providing protection against modern attack: in this again, we stand unique among the nations—but shall this be called patriotism?"

Lieut. Fry presents the anti-coast-defense sentiment, but there is a hopeful sign of popular support for our movement in the fact that he seems forced to prove its existence by quotations from the unAmerican columns of *The Nation* and the *New York Evening Post*. Everyone knows that any plan for our national protection and power is gall in the cup of the authors of these publications. Our defense scheme will be loved for the enemies it has made.

The regular artillery is under obligations to the writer of "Our Coast Defense." He has presented the case to the public with bluntness and honesty impossible for a regular officer under the regulations; and he has gathered, with clearness and discrimination, the leading questions at issue and presented them to the public and to business men in a most impressive form. His papers are sound and vigorous and should be read by every army officer. The May issue will continue the series.

H. L. HAWTHORNE,  
1st Lieut., 1st Artillery.

### The United States Public Works,—Guide and Register.\*

Capt. W. M. Black, Corps of Engineers, U. S. Army, is the compiler of a "Guide and Register" of the Public Works of the United States, published by John Wiley & Sons, 1895, New York. It is intended for the mutual benefit of U. S. Engineers in search of supplies or contractors, and of dealers and contractors desiring to do business on such Government works.

To fulfil the first purpose, it contains many advertisements of reliable dealers in engineering supplies and a directory of reliable contractors for engineering work; for the

\* *The United States Public Works. Guide and Register.* By Captain W. M. Black, Corps of Engineers, U. S. Army. John Wiley & Sons, New York.

second purpose, the laws and regulations governing the execution of Public Works, together with forms of contracts, bids, bonds, vouchers for payment, etc.

Descriptions of various kinds of Public Works and the methods pursued, together with copious illustrations of plant used and tables of cost are valuable to both parties; to engineers in charge for reference and to dealers and contractors for information necessary in formulating bids and estimates.

The book also contains a directory of Public Works under construction; and of the addresses of the heads of departments which have or may have such work to execute; also of many of the local officials in charge of such works.

The book is beautifully executed as might be expected of Wiley's house and will prove a mine of information and reference to those interested in the Public Works of the United States. It is unfortunate that such a directory must be revised periodically to maintain its intended value for the engineering profession. But such revision, if carried out *de novo* say every three or four years, would result in a unique encyclopædia of the Public Works of our country, of peculiar interest and value.

T. A. B.

### Gustavus Adolphus.\*

This is the fourth volume in the series of important works which Colonel Dodge has undertaken to complete, and for which the English student is already under so much obligation to him. Like its predecessors it contains food for various minds. It has its lessons for those who look below the surface, to whom war means much more than beating an adversary, who view its combinations as the chemist does those of the elements from whose fiery collision and noxious fumes are to arise new forms of beauty and use. Its perusal will be instructive for the intelligent student of strategy and tactics. For the military pedant it will be just as misleading as are and will be all books about war that have been or are to be written. Finally, it will be a mine of information to those who have only a *dilettante* curiosity to know in what manner and with what weapons an unknown number of millions of men have cut each others' throats (not counting incidental millions of women and children) during some fourteen centuries of the Christian era. And it is a strange cycle through which the throat-cutting business of this volume carries us,—from Adrianople to Poltava; from Theodosius to the half mad "King of the Goths and Vandals" (for so ran the title of the Swedish sovereigns) fleeing for refuge, in the eighteenth century, from the successors of Alaric and Attila, to the very province where, in the fourth century, squadrons of other Goths and Vandals had done what, as our author tells us, cavalry had never before compassed since Hannibal's Numidians waded in the blood of Cannæ. Had Dr. Johnson been as familiar with later Roman history as he was with decadent Roman poetry, the mere mention of the names would have suggested another sonorous antithesis to illustrate "The Vanity of Human Wishes."

There is a saying of Napoleon, repeated by him in different forms, to the effect that the carefully written military history of seven commanders preceding himself—Alexander, Hannibal, Caesar, Gustavus Adolphus, Turenne, Prince Eugene and Frederick—would be a complete treatise on the art of war. "*Lisez, relisez l'histoire de leur quatre-vingt-huit campagnes; modèles-vous sur eux,—c'est le seul moyen de devenir grand Capitaine.*" These words have become a part of the military student's gospel. They are quoted in the introduction to numberless works on the art of war. They form the text on which our author has written four entertaining and instructive works. Yet, like other texts in other gospels, the inspiration of this one is not beyond criticism. Nay, more; it was not

\* *Great Captain Series*. Col. T. A. Dodge, U. S. A. (retired): Houghton, Mifflin & Co., 1895.

true when Napoleon uttered it, and least of all is it true now. With unusual modesty, Napoleon left his own name out of the category; omitting it and those of his contemporaries, there were, of course, practically none left but those he mentioned who could be regarded as the great expositors of the art of war. When, in his youth, he pored over military history, he had to study these or none at all. And his principal text book for the study of his more ancient heroes, as it has been the text book for many another great captain, was "Plutarch's Lives." Yet we should now hardly think of requiring an examination in our military schools on "Plutarch's Lives," or on other and more elaborate works relating to the worthies of whom that author treats. Were that not true, there is no military school in this country or in Europe, the curriculum of which is not sadly deficient. And if it is true, why go on repeating the statement, merely because Napoleon made it, that the study of these lives and campaigns (among others) "*est le seul moyen de devenir grand capitaine*"? Probably the explanation is that of all men, military students are the most conservative. We shall continue to repeat and believe such sayings for a long time to come, from the mere force of inertia. They belong to our professional cant. There were physicians who quoted Hippocrates and Galen in the presence of Hunter; naturalists who cited Pliny to refute Cuvier and Buffon; astronomers who clung to Ptolemy though holding daily converse with Kepler, Copernicus, and Galileo.

Of course it may be said, that in matters of medicine and natural history and astronomy Galen and Pliny and Ptolemy were largely wrong, while in matters of war Alexander and Hannibal and Cæsar were largely right. And that is true. But even if Galen and Pliny and Ptolemy had been absolutely right, so long as we know no more than we do of the details of their teaching no eager seeker after truth in our scientific schools would allow himself to be diverted from the clean cut models of his own time in order to grope for the hazy outlines of the same figure in the mists of antiquity. As a matter of fact the whole of military as well as of scientific history, from Alexander to Marlborough, could be obliterated and, except in one respect yet to be pointed out, the student of to-day be none the worse for it.

Most writers entirely misconceive the nature of the influence which the study of the wars of the demi-gods—Alexander, Hannibal, Cæsar—when the world was young, has had upon the minds of men like Napoleon. The former were protagonists, but not prototypes. They were the leading, and in point of time, the first actors in the drama the scenes of which were played in their own age. But they were not prototypes, in the sense that they were the models upon which later genius was formed. Each, ancient and modern, has been cast in his own mould. But, when the mould is broken, there is as yet, as in the old Greek fable, nothing but an inert form. It is patterned upon a divine model, but it is still clay of the earth. It becomes a living image only when there has been breathed into it the breath of life. And for the mighty souls that have become the world's leaders in the arts of war and peace this breath of life, this divine *afflatus*, has most often been the spirit of burning enthusiasm which in some mysterious way is communicated from mind to kindred mind, inspiring it with boundless hope and confidence, teaching it that it too has the powers of a creator, and filling it with nature's unspeakable yearning to bring forth deeds after its kind.

Limiting our attention to only those heroes whose lives have been delineated by our author, the two mental qualities which strike us first and most in the character of each are enthusiasm and imagination. Napoleon placed the latter first in the order of intellectual qualities which every great mind must possess. To him the power of imagination was the power of "imaging" things as they are, of seeing them in their essential verity and not as they appear to be through distorting media. Pretty much all the evils that individuals and communities suffer from are due to a lack of this power. No sane mind

wilfully does that which will result in injury to itself. There would be no trouble if we could clearly imagine what the condition of things will be after we have done what we contemplate doing. The blind man falling over a precipice exclaims "If I could have only seen what was before me!" And what sight would have been to that blind man, imagination is to all men whom we justly call great. To Napoleon, for example, within the narrow limits of his military business, it meant the power of seeing his enemy's dispositions before a battle or at a critical moment in a campaign, by first obliterating from his mind all knowledge of his own dispositions, then replacing it by such knowledge alone as his enemy could have, and then imagining what, with such knowledge, he would himself do if he were in his enemy's place. He has himself told us that that was the secret of his method, and when his mind,—that is, his power of imagination,—was at its best, it invariably gave him the key to his adversary's movements. Now, this power of imagination, common to all great minds, is always accompanied by a sanguine temperament, is absolutely dependent upon mental enthusiasm. It is only when the latter blazes that the former can see its way. And this is the service which the study of the heroes of antiquity did to such men as Frederick and Napoleon. It fired their enthusiasm in the light of which all the innate powers of their being stood revealed to them. After that they needed but the opportunity, and their path was as inevitable as that of the eagle towards the sun.

It has been said—our author has said it—that without Alexander, Napoleon would not have been Napoleon. That is not true, it cannot be true, if it means that Napoleon had to rely upon the vague knowledge that we have as to the details in the operations of Alexander for his lessons in the art of war. It may be partially true if it means that Napoleon's first consciousness of the powers that lay within him germinated under the burning enthusiasm inspired by the mere contemplation of the deeds of the great Macedonian. So, had there been no Alexander, no Hannibal, no Cæsar, the study of the *Syntaxis Mathematica* might have made a great astronomer of Napoleon, the *Opus Majus* of the Admirable Doctor might have made him a great chemist; but it would scarcely be allowed that he could have learned much astronomy from Ptolemy or much chemistry from Roger Bacon. On the other hand, without an Alexander, a Hannibal, or a Cæsar, Napoleon might have been Napoleon still. No man can define the nature or the limitations of that subtle essence which we call genius. Nor can we safely assert the conditions which will or will not warm it into life. In a former work Col. Dodge, referring to Alexander, has said: "He had no equal predecessor who left him a model for action. He showed the world, first of all men and best, how to make war. He formulated the first principles of the art to be elaborated by Hannibal, Cæsar, Gustavus Adolphus, Turenne, Prince Eugene, Marlborough, Frederick and Napoleon. It is certain that Hannibal drew his inspiration from the deeds of the great Macedonian; equally certain that Napoleon, robbed of his knowledge of Alexander and Hannibal and Cæsar, would never have been Napoleon." Our author is here like a court chamberlain who has to marshal in order several dignitaries of equal right to precedence. It is well enough to say that one must go first and to let that one be the eldest, but there is sure to be trouble if he assigns other reasons for the arrangement, for he will almost assuredly be in the wrong. Napoleon was Napoleon because of Cæsar and Hannibal; they were what they were because of Alexander. How shall we account for Alexander? We all know that the world rests on the elephant; and any one can see that the elephant rests on a tortoise. But upon what does the tortoise rest?

That Frederick and Napoleon received an inspiration from the deeds of the great captains of antiquity,—yes; but that the vague records of those deeds served them as a text book from which they learned the combinations of war, decidedly no. Can any one doubt



that, even without Alexander, Napoleon would have had the same wonderful power of scientific imagination, the same boundless self-confidence and the power of inspiring confidence in others, the same *coup d'œil*, and that, therefore, with the same opportunity, he would have done about the same things? In speaking of the influence which reading and study has had upon the careers of great generals, Colonel Dodge says: "It might be claimed because Frederick hated war, that he was an unread soldier; but who except he unearthed and profited by Epaminondas' matchless oblique order, which had lain buried for two thousand years?" Does Colonel Dodge really mean that had it not been for Epaminondas, Frederick would never have used the oblique order? That without Leuctra there would have been no Leuthen? Had this order lain buried for two thousand years because of innate stupidity on the part of generals who failed to see its utility? We all know that there is nothing "matchless" *per se* in the oblique order. It was so on most of the occasions when Frederick used it, simply because the relative conditions of drill, discipline and manœuvring power made it advantageous to use it. Had these conditions been reversed, Frederick might have read of Epaminondas till his eyes were dim, but he would never have used the oblique order. Why should we make a mystery of the teachings of common sense? Can we not suppose a modern boxer to know that a well placed blow under the ear is more effective than a face blow and that to plant it safely he must be quicker with his feet and arms than his adversary, even though no wearer of the cestus had demonstrated the same thing at many an ancient Olympiad? Common sense has taught all men that the combinations of war rest upon the fundamental principles of mechanics known alike to Napoleon and Alexander. That which makes of one man an Alexander or a Napoleon and of another a pedant is that apparently simple but unusual power of seeing just which fundamental principle is applicable to the conditions of the moment. Could this power be acquired from books, Colonel Dodge's "Great Captains" would be the biography of pretty much all soldiers who have known their alphabet; we would not now know the difference between Alexander and Jones, between Napoleon and Smith.

But however views may differ upon this subject, there can be no doubt that Colonel Dodge's latest work, like its predecessors, will repay the student's most careful perusal. It contains a clear exposition of the organization, armament and tactics of armies from the decline of the Roman power to the time when the foundation of the modern military system of Europe was being laid. The preceding volume left us with Cæsar lying dead in the Senate chamber at the feet of the curule chair; the present one leaves us just before we can hear Frederick playing the flute and reciting French sonnets, when by all rights—in view of his subsequent career—he should have been reading Arrian and Xenophon and the Gallic Commentaries.

But as we read, the conviction grows that the author attempts to crowd too much within the covers of one book. Instead of confining our attention to the great captains whose names are the leading titles to the series, he fills in the spaces between by sketches of all other campaigns that have had any political consequence. Thus we have a history of war, rather than of the art of war as illustrated by a critical study of the campaigns of the few epoch-making commanders. The history becomes encyclopædic. The result, in this particular case, is that the man who might well have a volume to himself, the most universally popular hero of modern ages, a king and a soldier whose political and military career alike need the elucidation of military criticism, receives from birth to death only twenty-five chapters out of sixty-five. And seven of these are devoted to his early life and the Polish wars from which no military instruction is to be gained. These seven chapters are none too much in a Life of Gustavus Adolphus; they are entirely too much in the military Life of Gustavus Adolphus and some eight or ten others.

Turenne appears at intervals through seventeen chapters; Marlborough and Eugene get about nine more. When we think of Wolseley's fine study of Marlborough the space here given him seems entirely too small to warrant the comparison which the author draws between him and Prince Eugene. But if he had received his fair due what room would have been left for Gustavus? This method of grouping and of proportioning space hampers a fair judgment of the characters portrayed. We find ourselves accepting them at the author's valuation merely because the just perspective has been destroyed. In all those things which, taken together, make a great man, Gustavus Adolphus was *facile princeps* in this group. As a soldier he should not appear nearer the foreground than three or four of the others; but the author has drawn him as the wall carvings of the Egyptians represent their kings,—a colossal figure surrounded by pigmies. For illustration but not comparison it may be said that this is like the trick by which the cunning fisherman, in grouping his catch before the camera, makes his brook-trout look like salmon.

Space will not here permit even a cursory examination of the many campaigns described. Their careful study is the compliment which each reader owes the author and may be trusted to pay. But there are several interesting considerations suggested by his account of that brief two years' campaign in Germany which will make the name of Gustavus Adolphus live as long as liberty is cherished among men. If the one be eternal the other will be immortal.

Most students have seen occasion to question the figure which likens war to the game of chess. False it certainly is as applied to the wars of the seventeenth century. It is true—retaining the image for a moment—that in war as in chess the bishops are sometimes sacrificed to save a knight, the knights to save a rook. But in chess the bishops are sacrificed to win the game; in war the sacrifice of the bishops sometimes is the game. In the summer of 1630, Wallenstein threw away knights, bishops, pawns, and allowed checkmate to his king. Yet Wallenstein was a great general. Checkmate to his king was his game. Statesmanship, not war, is a game of chess, for war itself is only one of the pieces in the game.

By the year 1630 Gustavus had wrested the eastern shores of the Baltic from Poland and Russia. Denmark and a part of the north coast of Germany were all that prevented the Baltic from being a Swedish lake. In the summer of that year he landed in Germany, encountering but little opposition from the Imperialists. By the spring of 1631 he had occupied most of the strongholds of Mecklenberg and Pomerania and had secured the right of way through the territories of his brother-in-law, the Elector of Brandenburg, though as yet he had come to no definite understanding with him. After much manœuvring Tilly withdrew and laid siege to the opulent city of Magdeburg, leaving Gustavus free to secure the line of the Oder which he did by the capture of Cüstrin, Frankfurt and Landsberg. At length he moved westwards toward the line of the Elbe, by way of Berlin and Spandau. But it was too late for the relief of Magdeburg. News of the capture and almost total destruction of that city reached him while on the way. Thereupon he fell back to the line of the Havel, expecting Tilly to follow him. As the latter, instead of doing this, turned his attention (under political pressure) to Hesse-Cassel and Saxony, while continuing his grasp on the Archbishopric of Magdeburg, Gustavus moved by his right where the country was practically secured for him and occupied a strongly fortified position lower down the Elbe, at Werben, thus threatening Magdeburg from the north. Tilly had not yet proceeded far in his intended operations. He returned, joined Pappenheim, who was holding Magdeburg and made an unsuccessful attack upon the Swedish position. But as Gustavus showed no purpose to move, Tilly resumed his interrupted operations against the Protestant States of North Germany and by the middle of September, 1631, had captured Leipzig and overrun a large part of Saxony. Meanwhile Gustavus

had been slowly moving southward. He now joined forces with the Saxon troops and meeting the Imperialists at Breitenfeld, a few miles north of Leipsic, in that same month of September he inflicted upon Tilly a defeat so crushing that it was not far from annihilation.

For the moment there was nothing to oppose Gustavus' progress, go whither he would. On the one side, between him and Vienna, there were in Silesia and Bohemia probably not more than 10,000 badly demoralized troops. In the other directions there was, for the time, nothing; nothing, that is, except the wealthy provinces and fair cities of the *Pfaffen-gasse*—the Priests' Alley—where the rude northern peasants now for the first time "saw with their eyes and tasted with their lips the riches of the south." "Our Finnish boys," says a contemporary writing of this time, "make rich wine soup in their helmets; they will hardly care to go back to their savolax again." Gustavus was too good a general to be led in any direction merely for the sake of the plunder, and as yet the finances of his country and foreign subsidies made plunder unnecessary for the support of his troops. But likely enough he gave pious thanks for the incidental fact that so much rich booty lay in the direction in which, for other reasons, it was his interest to go. Disguise it as we please, he did plunder with a right good will. And what surprised and pleased both friends and enemies in that hard age was the unusual courtesy and gentleness and piety with which he set about it. He said grace both before and after the rich dish now set before him. He did not use thumb-screws or iron boots or the toasting of heels before slow fires, which were the *open sesame* of Walloons and Croats, although there is plenty of contemporary evidence that "our Finnish boys" had by this time learned a sad trick or two in the throat-cutting and purse-lifting business. Indeed, such accounts of the gratefulness of burghers and peasants and priests, too,—all except the Jesuits—for his extraordinary delicacy have come down to us, that there are now many writers who deny that he plundered at all. Still, all that next winter, Gustavus was in wondrous good humor over the fact that the pay of his army now required but one-sixth of the revenues of his kingdom, whereas a few months before it had consumed five-sevenths of it.

And so, because they did not know the thoughts,—partially, at least, inchoate as yet,—which were concealed behind that fair brow and smiling face, Protestants and Catholics were alike amazed and disturbed when Gustavus set off at a rattling pace down the Priests' Alley. The winter of 1631-32 found him in luxurious quarters on the Rhine, holding a splendid court with princes for his attendants and pretty much all of Germany, save the Electorates of Cologne, Trier and Bavaria, under his control. His army, with allied forces, was more than 100,000 strong, and he hoped to increase it to nearly 200,000, horse and foot, for the ensuing campaign.

Meanwhile Tilly had gathered a new army with marvellous rapidity,—in those days there was on all lips the proverb, "he whose house is burnt must go for a soldier," and enough houses had been burnt to secure plenty of recruits for the Catholic leader even in Protestant states,—had moved southwards while Gustavus was settling himself comfortably on the Rhine and had laid siege to Nuremberg. Failing in his attempt he withdrew to Nordlingen. Passing over minor operations, the King, early in 1632, broke up his winter quarters with the apparent object of forcing Tilly to battle.

Without wasting time in speculation as to Gustavus' ultimate object in this campaign, the student, as a clue to its complicated operations, should keep in mind that at its outset the Swedes and their allies were scattered in eight separate armies over the whole of Germany—in Mecklenberg, in Bohemia, in Hesse-Cassel, in Magdeburg, on the Main, and on the Rhine where the King commanded in person, besides numerous garrisons; that Tilly, who was at Nordlingen and who had reverted to his former position of General of the League, had as his sole object, to protect the territories of Maximilian, the Elector of

Bavaria, now the only representative of the League; and finally, that Wallenstein, reappointed Generalissimo of the Imperialists, and who had written to Maximilian that he hoped by the end of April to have raised 120,000 men (apparently he never got more than half that number), was in a position to operate against Gustavus' chain of communications, force the Protestant Electors of Saxony and Brandenburg from their allegiance to him and cut him off from the sea-coast.

If we study these operations as we would a chess-board this would appear to have been a concerted and well understood plan. When we place the pieces on their respective squares the combinations are so obvious that it is hard to conceive that the positions were scarcely more than the result of chance. But that was the case, as we shall presently see. Otherwise no human agency could have saved Gustavus from ruin.

The campaign opened with a movement by Horn, Gustavus' lieutenant on the Main, against the bishopric of Bamberg. This drew Tilly—"the old Devil," as Gustavus called him—from his quarters at Nordlingen. Moving northwards he gave the first serious check which the Swedes had encountered. Gustavus now moved to the aid of his lieutenant, calling in detachments until his force amounted to 40,000 men. Tilly at first advanced into the Upper Palatinate as though about to join hands with Wallenstein. If this had been his intention he changed it, and fell back on the Bavarian frontier. Gustavus marched through Nuremberg, crossed the Danube and found Tilly in a strong position on the opposite bank of the Lech, where he seemed to have hoped that Wallenstein would join him. To prevent this, Gustavus forced the passage of the river in a most brilliant operation. In the ensuing battle neither side gained any decisive advantage, except so far as the mortal wound of Tilly was a gain to the Swedes. Much against his natural disposition Maximilian followed the dying advice of Tilly. He made an absolute surrender of Bavaria into the hands of Gustavus and fell back towards Regensburg to open communication with Wallenstein. Gustavus at once overran this territory, capturing the principal places and establishing garrisons. For the first time he now found himself in a country where not only burghers and peasants were alike bitterly hostile to him but where his troops encountered that unorganized, guerrilla resistance which so surely arouses every brutal instinct in even the most civilized soldiers. This was the kind of resistance the Imperialists had met and for years were to meet in the Protestant territories and it accounts in part at least for the beginning of those atrocities which afterwards became habitual. At any rate, we find the Swedes doing here pretty much what the Imperialists had done further north. Colonel Dodge says that the King made no other retaliation than levying contributions, but the Scotchman, Monro, who served in the King's foreign contingent, in telling us of the barbarity of the peasants says that these were "justly repaid by the soldiers in the burning of many Dorpes on the march, leaving the boores dead where they were found."

While these events were happening Wallenstein was driving the Saxons out of Bohemia. By May, just when Gustavus had reached his southernmost point in Bavaria, Wallenstein was over the border of Saxony, plundering and burning. He had no other way of supporting an army. The Emperor was notoriously insolvent. There is a deal of historical truth in the remark of the immortal Captain Dugald Dalgetty while in the service of the King, as there is in this one, after he had turned Imperialist,—“an experienced cavalier might get out of the country the pay whilk he could not obtain from the Emperor.”

Gustavus now felt the toils fast closing around him; the lion was in the nets. Without assistance he could scarcely hold Bavaria, much less attack the hereditary states of the Emperor. With Wallenstein in Saxony he dared not weaken his garrisons in the north. His only hope in the security of his line of communications lay in the steadfastness of Saxony and now he heard that the Elector and Wallenstein were secretly negotiating. So

he moved northwards with a heavy heart. But at Nuremberg, to his great delight, he learned that Wallenstein moving south from Bohemia and Maximilian moving north from the Danube were manœuvring to effect a junction a few days' march to the eastward. Here seemed his opportunity; by a rapid march he would prevent this junction and beat both generalissimo and Elector separately. But he took a terrible risk. Had he been a day quicker in his march he would have found himself with 18,000 men between the Imperialist forces, but within a day's march on either flank would have been Wallenstein with 40,000 men and Maximilian with 25,000 more who had been trained in old Father Tilly's school. But he was a day too late. So he fell back again on Nuremberg which he surrounded by a most elaborate series of fortifications and there awaited the attack of Wallenstein. But the latter was too wary to butt his head against the "Swedish feathers." He intrenched a camp to the southwest of the city in such a position as to cut the King off from his principal bases of supplies, while his light cavalry in which he was greatly superior, scoured the entire country. He could not however prevent the arrival of reinforcements. The city could not feed Gustavus; the country could not feed Wallenstein. On both sides it was a case of starvation and Wallenstein won. After two months of it the King attempted to carry by storm the key to Wallenstein's position but was repulsed with terrible loss.

Two weeks later Gustavus retreated. He could not stay in Nuremberg; he could not drive Wallenstein from his position; he could not entice him to open battle. He withdrew towards the northwest, while Wallenstein a few days later started northwards for Saxony. The King then made another of those movements which have kept military historians busy with explanations for two centuries. He moved back again to the south, over the weary ground traversed so often, hoping that he would thus entice Wallenstein to the defense of Bavaria and Austria. But it must be a stronger threat than this to divert Wallenstein from his settled purpose. Learning that he moved steadily on and was already in the heart of Saxony, Gustavus turned back, marching rapidly by Dönaauwörth, Nuremberg, through the Thuringian forest, until on the 16th of November, 1632, the two armies met at Lützen, not far from the scene of the memorable Swedish victory at Breitenfeld. This last battle of the King's,—for here he died as he would have wished to die,—was also a victory for the Swedes, but for scarcely any stronger reason than that they slept upon the field.

Here ends, for our purpose, the Thirty Years' War. It dragged its slow length along through sixteen more awful years and was then terminated by a peace which secured no more for Sweden and the Protestants of North Germany than Gustavus might have hoped for after the battle of Breitenfeld.

And now what are the military lessons taught by these brief campaigns on which the reputation of Gustavus rests? They are entirely misleading to the chess-board student; for the most part they are not obvious; they have been still further obscured by military writers who, while holding that Gustavus was a modern Alexander or Hannibal or Caesar, have had to rack their brains to explain movements that neither Alexander nor Hannibal nor Caesar would have made. It is easy enough to point out the advantages which Gustavus had over his opponents in the organization, equipment and administration of his army. He was both General and King. He was the sole arbiter of his own movements. The temporary political exigencies of this or that city or petty state need not swerve him from the main object of his campaign. His army—the Swedish part of it—had been trained by years of war in Poland and Russia. The tactical organization of this army gave it great mobility as compared with the Imperialists, but it is strange to see how little Gustavus knew how to make use of this mobility. His battles were almost invariably on the parallel order, infantry in the centre, cavalry on the flanks, artillery along the line.

Both sides were agreed as to the number of men per pace necessary for attack or defense—about ten or twelve foot and about six horse to the pace, excluding reserves. But they differed in the disposition of these men. The Imperialists were ranged in one deep line; the Swedes formed in two lines, each of half the depth of their adversary. The disadvantage of the Imperialist formation was that when the front was broken the rear rank men could do no good but were involved in the general confusion; on the Swedish side the second line more than once retrieved the disaster that had befallen the first line. Gustavus also secured a greater development of front by smaller organizations and more frequent intervals. Yet, after studying Gustavus' battle tactics, we cannot but feel that the much talked of mobility of his organization was only a latent power; it was there, but he missed its great use. Mobility, as a means of selecting a point and direction of attack he knew nothing of. There seems in that day to have been no conception of the mere mechanical art of manœuvring large masses. When two armies were about to meet, the troops were marshalled in long parallel lines, the laborious process often requiring hours to complete and often in full view of each other, and then one or the other advanced straight upon its opponent's front. When such is the best use made of it we need not waste time in discussing an army's mobility. The Swedes, too, had an advantage in improved fire-arms; the use of cartridges had been partially introduced into that army, and their artillery was more numerous and better than that of their enemy. Finally, Gustavus had an incontestable advantage in a well stored pay-chest which enabled him to keep his forces better in hand.

Yet every student knows that no one nor all of these advantages combined sufficed to account for those strange campaigns in which Gustavus passed through hostile or at best luke-warm countries from the snows of Scandinavia to the snows of the Alps. Mobility, improved fire-arms, excellence of tactical organization—we should expect all these to be shown in the beating of superior forces by inferior ones, or in one force driving an equal one from a superior position. But at Breitenfeld, had it not been from the error of Pappenheim, Tilly might have effectually nipped the King's budding hopes; at the Lech, Gustavus was unable to prevent Maximilian from a movement pregnant with the simplest principles of strategy which soon forced him to loosen his grip on all the south-land territory he had acquired; at Nuremberg and the Alte Veste he met a check from which he never recovered; while the barren victory of Lützen was due, not to tactics and organization, but to the savage Berserker valor of the Swedes who fought as might be expected of men to whom the King had just said, "if you flinch from the fight, you know well that not a man of you will ever see Sweden again."

Why, in the Spring of 1631, did not Gustavus advance from Cüstrin and Frankfort through Silesia upon the hereditary states of the Emperor and secure peace and toleration for Protestant Germany at the gates of Vienna? Why did he not aim at the same objective, through Bohemia, after the great victory of Breitenfeld? Why, in the following campaign, after failing to prevent the junction of Maximilian and Wallenstein, did he fall back upon Nuremberg, seeing his army waste away amid the horrors of those two summer months, allowing Wallenstein to force his game and suffering at his hands a most bloody defeat, when, at Würzburg he could have occupied an impregnable position with abundant supplies, could have protected Nuremberg equally well, could have stood guard over the Protestant States and absolutely commanded the theatre of war? Finally, after the disastrous check at Nuremberg, why did he allow Wallenstein to move north into Saxony while he himself moved south into Bavaria? Was it to conquer another insignificant bit of territory? He could not hold it unless he could beat Wallenstein in the open field. Was it to attack the hereditary States of Austria? Every military reason which could have been urged against such a course before Magdeburg or after Breitenfeld, applied with tenfold force now.



Upon the answers to these questions depend our estimate of Gustavus as a general. But these answers depend upon our knowledge of the great political object which he had in view at the beginning of his German campaign, and this knowledge we shall never have with exactness until we shall receive a message from the dead. But a fair study of his military career will greatly help us to a sound conclusion as to his political purposes. Only then are we in position to judge of the suitability of his military movements for the attainment of his political object—whether or not Gustavus was a great captain.

We start out with the undisputed assumption that Gustavus was a great man. But the modern historian, by a process of reflex mental action, carries back to a great man of the seventeenth century the attributes that we assign to a great man in the nineteenth. Were a King of Sweden now to invade Germany for the suspected purpose of placing upon his head the crown of the Hohenzollerns we should say that he was attempting to play the rôle of a vulgar conqueror; that a nineteenth century ruler whose course of policy was so contrary to the principles of his age must lack the qualities which indicate a great mind. And so the notion that Gustavus had any personal object in view or that he sought the aggrandizement of his country, though it constantly arises as a bugbear to worry the historian, is resolutely brushed aside as incompatible with his conception of his hero. Oxenstiern admitted that the King had in view the formation of a great Scandinavian Empire which would make the Baltic a Swedish lake, but denies that any vision of an imperial crown ever flitted through his mind at Frankfort, or of a kingly crown at Augsburg or Nuremberg. Yet there could have been no nobler conception than the one which anticipated in that seventeenth century the policy of blood and iron which in the nineteenth century created a United Germany. It was the dream of Ferdinand and Wallenstein—not such a United Germany as was then presented by the Holy Roman Empire—and in a nobler form it is almost certain that it ultimately became the dream of Gustavus. It could only be realized through military conquest,—for the Emperor, by Wallenstein, for the King, by himself. Under either of these men, if once established, it might have lasted for their life time. But the religious, political and commercial jealousies of petty states and free cities would have soon dissolved it, as indeed they prevented it. What Tacitus once said of a kindred people, “*servitutum suam quotidie emat et quotidie pascit*,” may justly be applied to these discordant states, for truly, while seeking the shadow of freedom, they were daily paying for and daily feeding their own servitude. If Gustavus was merely the chivalric champion of oppressed Protestants, intending to return to his own country as soon as he should have secured for them peace and toleration, he could not be regarded as a great general; for with the means to accomplish his object, he failed to adapt them to the end in view, leaving unattained at his death what he might have secured the year before. If on the other hand, he intended to rescue Protestantism by establishing, through conquest, an empire founded on toleration, all his movements become consistent with his general purpose.

But the establishment of such an empire could not have been in the King's mind when he landed in Germany. He could not have foreseen Breitenfeld and the magnificent vista which it afterwards opened to his view. He came with the undoubted object of lending a hand to the oppressed Protestant States; but he believed that could be best accomplished by realizing the fiction of the publicists of that age—the *Dominium Maris Baltici*. The Thirty Years' War had already run twelve years of its course, during which the fortunes of the Protestants had been reduced to the lowest ebb. Once or twice he had made a move as though about to go to their help. But the material guarantees for what Sweden was to get out of it not being sufficient, he went on with the obscure wars by which, almost without the knowledge of Europe, he secured absolute possession of the eastern Baltic. Now he suddenly woke into life. Wallenstein had hewed his way to the north coast. If he

did not bestir himself the dominion of the Baltic would be Ferdinand's, not his. Now it was that he said to Oxenstiern that he could no longer avoid intervention in Germany, "for the danger is daily drawing nearer to our own doors." And he wrote to Christian of Denmark, "Now we must positively concoct measures for our mutual defense and for the defense of the Baltic."

And all the measures which he took during the first few months after his arrival in Germany were admirably calculated for his object. He secured the entire coast and a good deal of the country lying back of it. It is true that in so doing he secured a base of operations for the war which all knew must follow, but whatever might be the issue of that war in other respects he hoped that he had laid a grasp upon the German coast which the Emperor could never make him loosen.

Yet, that notion of the "dominion of the Baltic," as Gustavus and others then conceived it, was a vain dream, as impossible of realization in that age as in ours. To them it meant the absolute control of the rapidly growing commerce which, since the discovery of the Cape of Good Hope, had become almost entirely ocean-borne. The ports of the Baltic were becoming the entrepôts of Central Europe. The control of that sea meant the power to tax this commerce, to open it to friends, to close it to enemies. Richelieu had been drawn closer to Gustavus by Ferdinand's proposition, in case he succeeded in his designs by Spanish assistance, to give to Spain a port upon the Baltic and to exclude all French commerce. If Gustavus succeeded he would control not only the incoming but the outgoing trade east of Hamburg. He would have Central Europe sealed up. His Scandinavian empire need only sit still and have the wealth of Germany, Poland and Russia fall into her lap.

The classical reader will remember the scene described by Xenophon when the immortal Ten Thousand had nearly completed their wonderful and triumphant march. They had fought their way through the burning deserts of Arabia and the savage mountains of Kurdistan, Armenia, and Thrace, battling day and night with treacherous foes, with summer and winter storms. And all that time the one object in their mind's eye, to which, though beaten back time and again, they returned with unswerving constancy, was,—the sea. At length, one day as the main body was slowly dragging its length along, nearly spent with toil and wounds, suddenly they saw the vanguard upon a distant hill waving spears and rattling shields, and a faint, far cry was borne back, repeated from mouth to mouth and gathering volume as it came, until the whole army broke into the glad cry "*Σάλαττα, Σάλαττα*,"—"the sea! the sea!" The sight of it brought life and hope, for on its far horizon they seemed to see, as in a mirage, its black expanse blending into the purple waters of the Ionian Sea dotted with the isles of Greece where were home and loved ones, liberty and wealth. And the feeling which burst forth in that long pent-up cry is emblematic of the yearning which every nation, not already hastening to its decay, has for the ocean which means to it life and wealth and power. For centuries we have seen Russia struggling, as did those old Greeks, to bathe her limbs in the life-giving waters. Beaten back from the Bosphorus she has turned towards the far off Persian Gulf and still more distant Pacific. Nor can any one doubt the day is near when, in spite of all the world, her yearning will be satisfied.

And so it was in the time of Gustavus. His dominion of the Baltic would no sooner have been secured than all Europe would have combined to break it. Had he lived it would have been a magnificent struggle, but one that would have exhausted the energies and resources of Sweden before her time.

But he believed that he could secure it and maintain it and his measures were well taken for that end. It was the course that he was now following which, more than anything else, accounts for what historians are wont to call the short-sighted lukewarmness of

the Protestant Electors. Like Gustavus and Ferdinand, they were seeking the most that they could get. In that age they could hope for nothing more than a semi-independence and that degree of independence they could have only as electors in the Empire, and in the Empire only as it had existed before Ferdinand, under the guidance of Wallenstein began his course towards absolute sovereignty. They were willing to make war on the Emperor's lieutenant in defense of their prerogatives. But they could not definitely break with the Emperor without throwing themselves unreservedly into the arms of Gustavus. There was no middle course; they were too weak to stand alone. On the one hand they hoped to still preserve their freedom as Electors in a Catholic Empire; on the other they foresaw their position as powerless vassals of a Protestant Empire. They preferred the former and they were right. We can no more criticise their course than we can criticise the operation of the law of gravity or the law of evolution. Even the lethargic mind of George William of Brandenburg, the drunken brain of John George of Saxony already vaguely conceived the coming dissolution of the Empire into independent states, though their final coalescence again into another great Empire which should be neither Catholic nor Protestant, but German, was beyond their ken. That latter day may well have been hastened by Gustavus' failure to permanently divide Germany into two distinct camps of opposing religions.

While endeavoring to force his brother-in-law, the Elector of Brandenburg, to an open rupture with the Emperor, Gustavus found himself close to the border of Silesia with a nearly open route leading to Vienna. Every historian pauses here to ask and answer the question, "Why did not the King at once advance and force the Emperor to a peace at the gates of his capital?" On his left, it is true, was his old enemy, Poland, but the event proved, and he well knew it, that Poland's hands for the present were tied. There was much reason for believing that such a course would have caused Maximilian to draw back the troops of the League and that the Emperor would have recalled the Imperialists, thus at once relieving the Protestant States from all pressure. At any rate, in the hope of this very thing, Gustavus attempted such a movement the following year on the Danube. It failed, but the circumstances were entirely different. Some have explained his course by saying that he could not move thus, before coming to terms with the Elector of Brandenburg. But a few days later, with all the loss of prestige due to the Magdeburg affair, he forced the Elector to terms at the cannon's mouth, and he could have done it now. And Brandenburg and Saxony would have preferred to see Gustavus picking their chestnuts out of the fire at Vienna, rather than completing his *dominium maris Baltici*.

Others have said that he had not yet secured his base for his subsequent campaign in Germany. That, of course, begs the question, for it assumes that he proposed such a campaign and therefore did not intend to march to Vienna. Moreover, there is no evidence, prior to the fact, that he contemplated the campaign which only became possible after Breitenfeld.

Finally, it has been said that he felt his paramount duty then to be the relief of Magdeburg to which Tilly had laid siege. Here is another instance of the reflex mental action so often met with in historical writing. We all know the awful fate which befell that splendid city. And we are apt to think that Gustavus knew that such would be its fate unless he prevented it. Yet nothing is more certain that neither he nor any man in Europe anticipated such an event if the city should fall. Villages were burned by the hundreds in the course of that war but great and wealthy cities with strong fortifications were captured to hold. If any one could have had an interest in the destruction of the city it was most likely to be the commander of a foreign garrison who was continually accusing the inhabitants of lukewarmness and treachery. From the beginning, where religious prejudice has not been involved, Falkenberg has incurred more suspicion than

Tilly. The best historians whom Colonel Dodge follows, now acquit the latter of all blame in the burning of the city. And without the burning, the accompanying sack would probably have been what that age would have called a very humane affair.

Col. Dodge is sometimes led into error by his just repugnance to everything that savors of dishonor. He calls the storming of Magdeburg by Tilly an act of "treachery on a par with that of Cesar against the Usipites and Tenchtheri." If it be no worse Tilly had nothing to be ashamed of. He had sent an ultimatum to the town demanding unconditional surrender, or he would storm the place. The Swedes were near at hand. Our author says that "Tilly now hourly expected to hear" of their approach. Falkenberg, the Swedish commander of the garrison, positively refused to surrender. But the citizens were disposed to treat. They met the following day and decided to negotiate with Tilly. Falkenberg vehemently and bitterly protested, saying that the King was within two days march. He succeeded in having the council adjourn without action until four o'clock the following morning. He knew that he was only trying to postpone a decision till the King should come up, and he knew that Tilly knew it. He knew that Tilly had a perfect right to attack the moment he learned that Falkenberg had said "No"; nay, more, had Falkenberg hesitated, Tilly might properly have attacked the moment he knew that the commander of the garrison declined to say either "yes" or "no." Had the King stopped his march during the negotiations the case might have been different. But with him hastening on, no law of war required Tilly to wait, with victory in his grasp, while Falkenberg spun out the time till relief should come. Nor did Falkenberg expect it. All the night preceding the attack he was on guard upon the parapets; it was after he had left this post to go to that early morning council where he was using every argument to prevent action favorable to Tilly's demands, that the storm began.

Had Gustavus taken the Silesian route towards Vienna he would probably have saved Magdeburg, he would have received the enthusiastic support of Richelieu, he would have found almost no enemy in his path, he would have had no bickerings of lukewarm friends to encounter, and he would most effectually have relieved the Protestant States. But he did not do this, and those who hold that his sole object was the relief of the Protestant States cannot believe him to have been a great general. But he was a great general, for that was not his sole object. Had he gone to Vienna, he might have secured a splendid peace, but he would have come back as empty handed as he went. He had determined to secure the Protestant States by laying in North Germany the foundations of his Scandinavian Empire against which they could rest as against a buttress. He would do good work for his co-religionists, but it should be *ad maiorem Suecicæ Gloriam*. So he stayed in North Germany until he had done his work, and he did it well.

The same queries arise as to his course after Breitenfeld. But here his motives began to change. That great victory had opened up possibilities that could never have occurred to him before. The instinct of the conqueror began to awake in him. Here, as before, the way to Vienna was open. No surer way to the relief of the Protestant States could have been taken than to follow it. With peace secured and a Diet of the Empire which could be forced to agree to all reasonable demands, he could have fallen back to the territory which he had already won and here played the part of Protestant Protector until the storm aroused by his aspirations to the dominion of the Baltic should break.

But he chose the other course. And whatever his object may have been, this course involved the conquest of all Germany. For what object could he have had in overrunning Catholic States and capturing their cities if, after securing paper instruments granting toleration, undoing the Edict of Restitution and such like things, he were to withdraw, leaving the majority to do as they had done before? Manifestly, if he had lived and his work was to be enduring he would have had to hold by the sword what he had won by the sword.

And so, whether we like it or not, from a military point of view we have to treat this part of Gustavus' career as that of a conqueror. If not, he was not a great captain. And from this point of view, he again, as far as his means permitted, did his work well. In the end, he failed, for before his death he had been forced to loosen his grasp upon most of what he had acquired in this campaign, and after the enormous sacrifices of his country during the next sixteen years they acquired nothing more than he could have demanded after Breitenfeld.

It was at Nuremberg in the following September that Wallenstein's keen eye had detected signs of the approaching collapse and he wrote to the Emperor, "I believe that the King's course is already downwards." But the collapse began before that, even at the time when Gustavus was receiving the homage of Maximilian's subjects in the capital of Bavaria.

Gustavus had allowed the dying Tilly—"the old hero, Tilly," a modern Protestant historian calls him—to escape after the battle on the Lech, while he turned to secure the fortresses of Bavaria. It was here, at the very acme of his power and glory, that he heard of Wallenstein sweeping everything before him in Bohemia and Saxony. It was time for the King to look to his communications with the north coast. And now began that strange series of hesitating, aimless movements that have puzzled the military historians so much. It would seem a simple thing for him to have called in his garrisons and detachments and marched northwards with all his force. But to withdraw his garrisons was the very thing he was unwilling to do. It is to be remembered that in that age publicists and treaty-makers fairly revelled in the principle of "*uti possidetis*." Gustavus had already listened to proposals for a general peace. He was ready now to open negotiations with Wallenstein. He even hoped for a Diet of the Empire in which the voice of Sweden might be heard. But in that event his credit and influence would be in direct proportion to the territory he held. He could not go into council with the representatives of the Emperor and the League having nothing but his naked sword in his hand. He must be able to offer a *quid pro quo* for the concessions he would demand, and hold cities and provinces in pledge for the fulfillment of those concessions.

And this leads us to notice the one great defect which, if we could be quite sure it were a defect from the point of view of his own time rather than of our own, would reduce Gustavus to the second rank among great captains. When the fight was on, no general of his day felt in a higher degree that enthusiasm and exaltation of soul which inspires confidence in the least confident and sharpens rather than confuses the perception of the born battle-captain. But the fact remains that except when his adversary forced his hand he did not seek a battle. Nor did he appear to realize the value of a vigorous and continued pursuit of a beaten enemy. After he had defeated Tilly at Breitenfeld he declared that he would follow the "Little Corporal" to the end of the world; but he did not do it, and every subsequent movement against that leader was in consequence of the latter's initiative. After his successful passage of the Lech he allowed the enemy with their mortally wounded leader to slip away and join the army of Wallenstein. He was chagrined to find the next morning that they had not waited for him to finish the defeat he had begun. Even then he might have followed, but he preferred to secure his hold upon the cities of Bavaria. He does not seem to have realized that with Wallenstein and Maximilian in the field he had no lasting grasp upon any of his conquests. A single disastrous battle would have lost it all. On the other hand, at this last and critical point in his career, by voluntarily abandoning his conquests for a time, withdrawing all garrisons except those absolutely needed to hold his line of communications, he might have put a force into the field that could have annihilated Wallenstein, and then all Germany would again fall into his hands.

Yet he may have been right. In those days peace was made at strange times and in strange ways. At any moment the alliances upon which he depended might be dissolved. Had he yielded what he held, in order to inflict a crushing blow upon his enemy in the open field, he might have been forced to treat before that blow could have been delivered. He would have yielded his pledges before he had secured anything in return.

And this would seem to be the only sound explanation—if, according to the conditions of his time he were an able general—for the position which he took at Nuremberg in face of Wallenstein and Maximilian. Could he have sacrificed a little territory for a while, he might have taken an impregnable position at Würzburg, with both flanks protected, with two bases of supply, with a very much greater force, and directly upon the flank of a hostile advance into Saxony which must be Wallenstein's only objective if he was to continue an offensive war.

The operation culminating at Nuremberg was, from the modern point of view, bad enough; and it was followed by one which seems utterly indefensible from any point of view. The best we can say of it is that it was an error in judgment, and errors in judgment are sometimes only spots upon the reputations of great captains. Gustavus retreated from Nuremberg towards Würzburg, where, it would seem, he ought to have gone two months before. But he only went a little way; he stopped long enough to allow Wallenstein to pass him on the way to Saxony, and then he himself deliberately turned south into Bavaria. It has been said that he hoped to draw Wallenstein after him and away from the Protestant states. But Gustavus knew that Wallenstein cared nothing for the territories of Maximilian, while Wallenstein knew that Gustavus cared a great deal for the electorate of Saxony. Others have held that he hoped to draw Wallenstein back by a threat upon the hereditary states of the Emperor. But this movement had scarcely the appearance even of a threat upon those states. A movement which would probably have been successful the preceding year, would now have been an act of insanity. And Gustavus well knew it. He knew that if Wallenstein held on, he himself must turn back. And he ought to have known that Wallenstein would hold on.

And so, all through this southward movement he marched "with his beard upon his shoulder," as the Spaniards say. At length Wallenstein again forced his hand; he had to turn back. And now, after his long hesitation and vacillation, appeared again in their full brilliancy, the qualities that made Gustavus a great leader of men. He had long parried his adversary's thrust. To the dogged, unyielding, almost satanic persistence of the Bohemian, the man of fate who read his destiny in the stars, he had opposed the phlegmatic patience of the North-man. But now the battle rage came upon him, and he turned like the lion at bay, which, in truth, he was. He moved north with a speed almost unheard of in those days of cumbrous formations and equipments, gathering force as he went. "The Swedes came as if they had flown," says Wallenstein. And even then, had he but the resolution to let go his hold upon everything else and concentrate his entire force for this final struggle, he might have done much more than seal his fame with his blood; the fair hopes which vanished with his life might all have been realized; and instead of the first stone in the foundation of the German Empire, the last one in the foundation of the Scandinavian Empire might have been laid on the field of Lützen.

TASKER H. BLISS.

### **Catechism of Outpost Duty.\***

The Catechism of Outpost Duty prepared by Capt. Wagner would be an indispensable work to every officer, had not the author previously published his "Service of Security

\* *A Catechism of Outpost Duty, including Advance Guards, Rear Guards, Reconnaissance.* By Arthur L. Wagner, Captain Sixth Infantry, U. S. Army. Hudson-Kimberly Publishing Co., Kansas City, Mo.



and Information," of which the Catechism is an abridgment in the form of questions and answers. All essential details contained in the larger work are embodied in this abridgment, which should prove invaluable as an aid to class instruction.

It is but a few years since the military student in this country was compelled to seek professional information in foreign works. We are to be congratulated that the red covered English treatises are now fast yielding their places on our book shelves to better works, prepared by American officers. In this good cause none has done the army or the country greater service than Captain Wagner, whose well-earned reputation is such that his name to a book is a sufficient guaranty of its excellence. Though not a pioneer in this field, his work is the first published in this country that completely covers the subject of outpost duty. From a multitude of sources he has gathered ideas, and these he combined into a harmonious and practical system of which we stood greatly in need.

General Sherman said that "an army is the most complicated of all human machines, requiring the utmost attention to details. Perfection in these goes far to insure success, and of all things perfect guard duty is among the most important."

The history of the Rebellion abounds in examples of disaster resulting directly from ignorance of this duty, or carelessness in its performance. Isolated posts were surprised and captured, and army corps even, were overturned and defeated almost before they realized that an enemy was near. The means employed to obtain information were often singularly crude and inadequate. An army corps could wander about, lost and useless, while a great and decisive battle was fighting but a few miles away. A Confederate general could play with a force outnumbering his own, three to one, holding a Federal army in check with a single division, overturning its cavalry, destroying important lines of communication, exposing meanwhile his own army to annihilation, and not only escape disaster, but carry off the honors of victory, a result not excusable, but comprehensible, only on the theory of lack of information on the part of the Union commander.

Under a well executed system of outpost and reconnaissance duty, such as is prescribed in Captain Wagner's manual, it is difficult to see how such disasters could occur, or how such great opportunities could be missed.

K.

### Gurley's Manual.\*

Fifty years ago the manufacture of civil engineers' and surveyors' instruments was begun in the city of Troy, N. Y., by Mr. J. H. Philips and Mr. William Gurley. Mr. Philips retiring some years later, Mr. L. E. Gurley formed with Mr. William Gurley the firm so well known as W. & L. E. Gurley; and under this name the business has since been conducted, although William Gurley, Esq., died in 1887.

The first edition of "Gurley's Manual" was published in 1855, a book of seventy pages. It was well received, and formed the first really practical treatise on the use and adjustment of civil engineers' and surveyors' instruments.

The revised and enlarged "Manual," having gone through thirty editions, is now used as a text-book in many schools and colleges, and is freely quoted in technical publications.

The capacity of the Messrs. Gurley's factory has increased as the demands of the profession have grown during the half century, until now it is probably the most extensive of its kind in the world.

The book contains carefully worded descriptions of all instruments used in drawing and surveying from a plummet to a planimeter and presented in a manner worthy of the well-known house from which it comes.

\**Gurley's Manual. American Engineers and Surveyors Instruments.* Published by W. & L. E. Gurley, Troy, New York.

